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MINOR ECONOMIC PRODUCTS.

Visit to Experimental Plantation.

WHEN a visit was paid to the Department of Agriculture on the 26th April an inspection was made of the experimental plantation and nurseries. The visitors were shown round part of the grounds by Mr. F. G. Spring (Agriculturist) who gave demonstrations on various plants of commercial value and it was evident that a keen interest was taken in respect of many of the crops. The visitors were first shown Patchouli (*Pogostemon patchouli*) and in dealing with this plant it was remarked that there was a fair demand, at present, for the dried leaf as a source of Patchouli oil. Some time was then spent in a five-acre block of four years old African oil palms (*Elæis guineensis*) just commencing to fruit. The suitability of the palm and its culture in Malaya were freely discussed. Its possibilities, as a plantation crop, were dealt with and it was remarked that large areas might be planted without affecting the market to any extent. A young rubber clearing, under terraced conditions, was viewed and the benefits derived from this system of planting, on hill land, were explained. Some interest was shown in a number of medicinal plants such as Ipecacuanha, *Croton tiglium* (croton oil), *Erythroxylon coca* (cocaine), *Cinchona ledgeriana* and *C. succirubra, Chenopodium,* and Papaya as a source of commercial Papain. Mr. Spring referred to the question of green manuring and dealt with *Centrosema plumieri* and the Sarawak Bean in particular. The following fibre plants were pointed out—Sisal, Manila, Mauritius and Bowstring hemps. Plants yielding various commercial products such as oils, dyes and spices were inspected as well as fodder and other grasses, fruits, economic and ornamental trees and plants.

On returning to the Offices the party was shown exhibits of economic products, which were grown and prepared locally. These consisted of—Tobacco, African Oil Palm fruits and a specimen of the oil, Camphor oil, Chenopodium seed, Ipecacuanha root, Fibres, Patchouli, Tuba root, Cinchona bark, Avocado pears, Indian corn, Artichoke tubers. Seed of *Centrosema plumieri, Canavalia ensiformis* and Sarawak Bean (*Dolichos Hosei*) were also exhibited. A collection of photographs consisting of a large variety of crops grown on the experimental plantations was on view.

THE FOOD-CROPS OF THE MALAY PENINSULA AND SOME THOUGHTS ARISING OUT OF A REVIEW OF THEM.

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According to trade statistics, the Malay Peninsula took from abroad for feeding itself in the year 1915 :

Cereals, costing	$23,471,049
Sugar, costing	5,789,951
Bean seed, and the like, costing ...	1,439,278
Vegetables, costing	1,352,128
Fruits, costing	1,274,163
Condiments of native food, costing...	1,227,455

paying the bills for these out of income from rubber, copra, sago, tapioca, and pine-apples.

I intend to use the privilege of holding your attention by speaking of these foods which we buy in such large quantities from outside the Peninsula : I shall touch on cereals first, commencing with rice.

Rice.

The year 1915 saw nearly fifty-two million dollars worth of rice enter our ports, and we kept twenty millions worth to feed ourselves. It came from Rangoon, Saigon and Bangkok chiefly. That which came from Rangoon was the overflow production of a population of about one soul to an acre of paddy : it is a growing population, and it has been calculated that in fifty years it will eat up its own produce, or in less than fifty years if the accepted plan of cropping should be changed. The same growth of population is occurring in Indo-China and Siam, and will have a similar result. Java has already filled up in a wonderful way, and has greatly changed its crops, with the result that it no longer sends overseas rice in the same way as formerly. The Philippine Islands have ceased to export and import. These changes are worth thinking over ; and the more one thinks the more important does rice growing appear to be in the Malay Peninsula.

Rice, unfortunately, pays comparatively poorly : so that officers charged with the duty of insuring its extension are confronted with great difficulties. Rice cultivation in the East is, at it were, the handmaid of all other cultivation—without rice the others could not exist—and it is paid in the manner of handmaids.

I propose to pass quickly along the ends of the avenues leading from the present position to greater profits, but merely glancing down them.

Rice is, on the whole, the more uncertain in its return the less the area grown: and being a crop of small cultivators there is a need of securing co-operation in working the larger areas. The great plains of Lower Bengal have been worked for rice for ages and carry such a population that the produce is only exported in the years when the yield is considerable. In the course of time these plains have acquired a peculiar flora and a peculiar fauna, in response to the annual submerging of the surface of the land, which keeps out the dry-land weeds of more than ephemeral duration, and excludes by rendering homeless all ground-nesting animals or insects which pass one stage of their life underground. Thus it has come about that these Bengal plains are relatively without rats, and when plague established itself in Calcutta the villages long enjoyed immunity on account of their isolation. As they are relatively without rats, so are they relatively without some other pests which are known to do great damage here. The long ages of cultivation, its persistence and its completeness have thus wrought changes favourable to the crop in its relationship to other life. Rats in Malaya are possibly the worst pests of small areas of rice, and birds next: after them come insects. As regards birds it is obvious that the more cleared the land the freer it may be; and the same also in respect of elephants and wild pigs: so that the wide co-operative area in a large way escapes these.

Co-operation is wanted for irrigation.

It is most interesting to observe with the eye of an ethnologist how in Malaya this needed co-operation has been obtained—how in Java, for instance, much of the land is held by the village collectively and parcelled out annually for rice-growing: how in the Malay Peninsula religious ceremonies have been adopted as a means of bringing the owners to work collectively. The fumigation of the seed with benzoin, and the prayers in the mosque, and all the poetry gathered about the soul of the rice is an equivalent for the prosaic scrap of paper on which a District Officer is empowered to write thou shalt repair thy runnels on this date and plant thy paddy on that. Whatever our feelings may be in regard to the liberty of the subject, I anticipate that no one will wish to contest the argument that the sawah is an unit, and that it is wise to coerce the cultivators of it just as they have been coerced in the past; because the State is the better off for the complete cultivation of any area of rice land.

The next matter is the extension of the rice lands.

Rice cultivation, bendang or wet rice cultivation and not ladang or dry rice cultivation, has established for itself two vigorous centres in the Peninsula, the one in the north, the other in the neighbourhood of Malacca. To the north it came as an extension only. Great and wonderfully settled kingdoms once existed from the Bay of Bengal to the China Sea across the belt of land from Rangoon to

Saigon: they were very populous before their prosperity invited attack from the north, and before the restless centuries came when Shan, Burman and Siamese wasted each other's lands and carried off wholesale each other's subjects, not for domestic slavery but to maintain their own wasted fields. The Kedah rice fields were the southern fringe of the cultivation of these kingdoms. On the other hand, the Malacca rice lands came to be what they are out of an overflow from Palembang or Menangkabau in Sumatra, when "the egrets on flapping wings" crossed the Straits to set up colonies on a coast which undulated like their own home. Both extensions invited European establishments in turn, Malacca first when the Portuguese found trade possible and profitable, and the Kedah area next, when Francis Light after living in it, built up the settlement of Penang upon its edge, well chosen and not foodless like the decaying settlement of Bencoolen.

There was something in the success of Malacca and Penang which might have read a lesson thirty years ago in the opening up of the Federated Malay States, to those who tried very earnestly to settle small colonies of rice growers in various places. So many of these colonies perished from their smallness. It had been easier then to have built on to the edge of that which existed: and it appears easier now to work at the extension of the Krian rice area than to dissipate efforts in diverse directions. I look upon Krian as the area for results in rice. But turning to Malacca, it must be noticed how limited, there, is the field for expansion, and that the problem is the maintenance of the sawahs and the getting of the landholders to rise to overriding those disadvantages to which they have been put by the washing of silt from the cleared uplands on to the paddy land.

Although rice grows in water, soil aëration is most important to it. Stagnant water is very inimical. There needs to be a movement over the surface; and there must be a movement through the soil. The best rice land is particularly open in texture. It is the practice to grow in the Peninsula one rice crop only in the year and to let the weeds riot on the land during the rest of the twelve months. When sowing time is coming round these weeds are ploughed in and make valuable green manure. Such a practice is by no means confined to the Peninsula but is very wide spread where rice is grown: its working has been studied particularly in Southern India, and it has been found what an important additional part the ploughed-in weeds play in the aëration of the soil. Down that avenue which points to greater profit from paddy by taking a crop from off the land in the fallow we may only look, bearing in mind the need of the fields of this green manuring which the second crop would disturb.

There are various places in the East where a second rice crop is grown in the fallow time, a quicker growing and less profitable

rice than the main crop; and in Java, where for one place this is done, the embankments are peeled of their turf that it may be thrown under the plough, or in Travancore, branch-wood is collected for the same purpose, or in Japan, special crops of the *Leguminosæ* are raised, all of which practices point unmistakably to the need of the green manure which weeds give in this Peninsula. In Travancore the system of cutting branch-wood became a danger to the State, for the hills were being completely denuded; and control had to be enforced. Under control it would be possible to permit it in Malaya.

Two rice crops per annum means the broadcasting of one: and broadcasting is very inferior to transplanting. Transplanting of rice, twice repeated, is even beneficial, just as it is to some of our garden annuals. But the second rice crop must forego the transplanting; and it is also the less profitable on account of the larger amount of seed that has to be used.

Crops, other than rice, which are used in the place of the fallow are, in Java, generally beans, chillies, ground-nuts, sweet potatoes yam-beans and yams: and each gives a certain amount of stems useful for green manure. More rarely do the Javanese plant maize, sorghum or the smaller millets. Maize is used as a rotation crop in the Philippine Islands. Trials of some of these might be made in the Malay Peninsula, demonstration following success; but to bring about any general use seems most unlikely.

The American farmer cheapens his rice crop by the extensive use of machinery, both for sowing and for reaping: and he is forced to avoid the valuable transplanting. He has firm subsoil which carries the machinery and moreover he is protected by tariffs.

All through the East scientific officers are investigating the races of rice for their Governments, seeking for the most profitable, and finding out the conditions demanded by them. But the work to be done is enormous. There is an Indian proverb which says that of the races of rice and of Rajputs there is no end. And Nature appears to intend to have none: for she crosses rices grown intermixed to a small extent. Miller's machinery, however, demands large uniform grain; and as the mill is by so much a more economical institution than domestic husking, so it is to be encouraged: and the growing of few races within the area served by a mill becomes desirable. We have before us then the harmonising of the two needs, the grower's of a prolific return, and the miller's of a suitable grain. I do not know whether we have two hundred or three hundred races of rice within our borders,—we certainly have many; but I am sure of this that the Malay's methods of cultivation are not consistent enough to tell us which of the races known to him are the best: so that I think we have his races to test, as well as the larger number that might be brought in from outside.

The Malay has a sound practice of taking his seed-rice from the best part of the field: but scientific selection by pure-line cultures would do much more for the crops.

I have brought into view selection last: and I think that in point of time it comes last as a means of improving the prospect on growing rice. I think, but I may be wrong, that the first results should come from the work of the agricultural engineer, and administrative measures taken to ensure protection against pests, not animals only directly injurious but the worse evil—loss of plough-cattle by disease. As to the work of the agricultural engineer, I should like to refer to that practice in Java, whereby rice land is let out for sugar growing, not to recommend its use here, but to call attention to the improved irrigation and working of the soil which the sugar mills apply to their crop and which exercises a beneficial influence upon the rice crop following the cane.

In the Philippine Islands the knot of rice improvement has been cut by tariff protection.

Maize.

Maize appears to demand the place of second cereal for the Malay Peninsula: and a good sign for its adoption here is that its area has had considerable extension lately in Java, where it has become an article of export. Before maize reached Africa, sorghum was the staple crop of the south, the bulrush-millet that of the sub-tropics, and ragi that of the tropics themselves. Maize has shown a tendency to oust them all. It does not show the same tendency to oust rice, where that crop predominates, and I think the reason of this to be that the housewife must cook maize for twice as long as rice; and where she is used to boiling rice, given maize, she makes the household ill from serving up half cooked porridge. When maize shall assert itself in India, it will be by spreading down from the hills of the poor tribes who eat millet or from the wheat-eating north-west. If its use can be spread in the Malay Peninsula, it might be forwarded through the planters encouraging it.

Maize is a very wide-spread crop, and gives races suitable to quite dissimilar climatic conditions. The races fall into groups, of which the sugar-maizes are the most toothsome and are used as a vegetable: the flint-maizes are good for storing, and the soft maizes are not. Various races have been introduced from time to time into the Peninsula and lost sight of again, because the market did not exist for them: the two or three which we have left, persist as garden plants. It is hard to find what races have been tried.

The crop is not on the ground for long. Some races take only two and a half months to mature, others take three, and up to or beyond four months. With a crop of such short duration, it is not difficult to find a season, having the last month relatively dry,

wherein it might be raised. Maize likes a good soil, but it does not remove much from it; and it permits cultivation to be continued while it is growing.

Ragi.

The third cereal for Malaya is perhaps ragi—*Eleusine coracana*: but after rice and maize none is worth much consideration.

Ragi is grown in India on poor lands, and in the Himalaya largely fulfils the function of furnishing beer. Elsewhere in dry seasons and over dry areas the quantity grown increases, a fact which speaks against a wide use of it here. It is on the ground for six months.

Sorghum.

Sorghum holds in India a very much higher place than ragi, but for areas where there is no forest; and in them at harvest-time the air resounds with the din of boys acting as scarecrows, or the incautious passer-by may find himself bombarded with clay pellets intended for the flocks of small birds which demand such a large toll out of the crops. In forested areas sorghum is rarely grown and then in the less productive feathery panicled races in small quantity.

The smaller millets would only be grown here by Sakais and the like.

Sugar.

The second group of food-stuffs on which the Peninsula pays so greatly is sugar. But sugar-making has unfortunately recently died out for economic reasons, and it cannot be made to pay until labour is again cheaper.

It is believed that there were Chinese cultivating sugar-cane in the area, now Province Wellesley, before the founding of the Settlement of Penang. And it is recorded that in 1800 labour had become too expensive for it to pay. Then again the situation improved and in 1836 there were Chinese in the Province who, on quite a considerable scale, made sugar either black or clayed according to the state of the market which they watched very closely. From Province Wellesley the industry spread into Krian: but it never really developed so as to send its produce beyond the local markets. And after one big effort at working with the best of machinery sugar making died out.

The modern sugar industry is a wonderfully developed one: efficiency to the last degree is needed: big central factories pay best because of the economy in working: every advantage has to be sought for: the cane must come to hand in steady and adequate supplies, and the by-products must find a sale. Then again very much of the sugar produced comes to the market with tariff protection or artificial aid: and from all this I do not see any way of reducing the sugar bill of the Peninsula. That cane which is grown for eating seems eminently suited for the purpose, and the introduction of new races is hardly called for at the moment.

I pass to the third group of food-stuffs, namely, bean-seeds and the like.

Rice-eaters cannot live on rice alone and always seek some food which provides them with nitrogenous substances. Most of them seek fish: but where the caste system forbids fish too sternly and beans are procurable, beans are used. It is very interesting to observe the schism among the Brahmins of India whereby those of Bengal, beans apparently not having been easily procurable, have permitted themselves fish to save the race: and there are Brahmins also in Kanara who have gone the same way. The Burmese in a corresponding dilemma have developed a plea that he who takes the life pays the penalty, but he who eats the fish is blameless. The Malay free from the trammels of Buddhism or Brahminism, balances his diet with fish. But failing fish or some sort of flesh, beans are almost a necessity, and the demand of the Peninsula for them will always be great. We get them from the side of India and we get them from the side of China. We produce none.

One of the chief reasons why we do not raise any, and I think the chief reason, is that bean crops are the produce of a more advanced condition of agriculture than ours. Further it is certainly to the Malay a more congenial occupation to fish than to till his rice land for a second crop.

Peas and beans are always rotational crops, sometimes of a more complicated rotation, but generally merely alternating with rice. Where they fall in the system depends on the climate. Thus in Assam they are sown on the last rain of the wet season to be watered afterwards by dew and an occasional storm. In drier places they occupy the land in the rainy season. Here they would take the place of the rice land fallow, as in Assam and as in Java; but they could also be a subordinate crop to maize, at another season.

The chief of the bean crops of Java is the soy bean—*Glycine soja*. It returns, at 3-4 months, it is said, more or less 3,200 lbs. per acre, which is more than the Manchurian soy bean usually yields in Northern China. Let it be remembered that there is considerable difference between the flat-seeded Java plant and the round-seeded Manchurian plant: and that the unsatisfactory results of experiments in the Malay Peninsula with Manchurian seed in no degree prove the Javanese plant not worth growing.

Java, second to *Glycine*, grows in rice land various species of *Phaseolus*, notably *Phaseolus radiatus*, the Mung of India, *P. vulgaris*, the French bean, and *P. lunatus*, the Lima bean: also there are others. We know that we can grow these horticulturally in the Peninsula: and though I have no knowledge of any agricultural experiments, it is quite probable that success might attend them.

Success might also attend the growing of *Phaseolus calcaratus*, *P. Mungo* and perhaps *P. aconitifolius*, all common in India, as well as the Japanese *P. angularis*.

I anticipate no success with the chick pea, *Cicer arietinum*, and the lentil, *Lens esculenta*; as they favour a drier climate, and are only to be found in Java at considerable elevations. The Field pea, *Pisum arvense*, also, for our plains is out of the question.

Ground-nut cultivation has latterly been a source of large profits on the sandy river banks of Burma. But it is grown for oil and not for eating, for which purpose there are distinct varieties differing much in the chemical composition of the seed: and I prefer to consider the ground-nut as an oil seed, and not as a food.

Voandzeia, the Bambarra ground-nut, is more ideally a food crop, but it is of doubtful importance.

Vigna catiang and *Cajanus indicus* both grow well here, and are used as vegetables: but they furnish abroad seeds for eating. The latter yields for three years if it be appropriately cut back; so that it is not a crop like the other beans and will not take a place in alternation with rice. *Vigna catiang*, under the name of cow-pea, takes a very important place in the agriculture of the United States where the climate is not suited for clover; but it is not grown there for the seed, but for stock feeding and for green manure. Collection of the seed-harvest is laborious as it has to be done by hand daily; and it is never large.

Two other leguminous crops may be mentioned, namely, *Canavalia*, the sword bean, and *Mucuna* or *Stizolobium*, the velvet bean. Sword beans are eaten somewhat extensively in Mysore and some parts of the Bombay Presidency, and are grown a little in the Malay Peninsula. The seeds are quite wholesome, but the pod is generally consumed here unripe.

Condiments.

I turn to condiments of native food. They are the last group of the food-stuffs for which I gave you trade returns: but I take them next as they are in such a large measure sold dried, and therefore like cereals and beans travel easily and are stored. I consider under the head of condiments such foods as onions, garlic, chillies, ginger and cardamoms, which are in general use for flavouring and mixing with the more bulky substances that make up native food.

Onions can be grown in the Malay Peninsula, but perhaps not commercially, as the damp climate is unsuited for the arrest of leaf growth and the formation of a bulb. A few trials with them are recorded but no attempt has ever been made to ascertain exactly what can be done by seeking out the races (they exist) which do best under damp tropical conditions. Onions are grown

at quite low elevations in Java, and quite widely through India near towns: but it will be admitted that the drier north and north-west of that country is better for them than the south. However, I would remind you that an onion industry has spread downwards into the West Indies from the north, by the choice of races appropriate to the climate.

Garlic is more suited to the climate of the Malay Peninsula than the onion: and considering how large are our importations, experiment with it is desirable.

Chillies can and should be grown extensively through the Peninsula. They can be raised easily and fruit from the age of four months forward. Rain may cause some injury to the fruits by encouraging the growth of a fungus and perhaps also by encouraging the attack of the little fruit fly. Chillie drying is never to my knowledge resorted to in the Peninsula.

Ginger cultivation is, I am glad to say, extending in Malacca, where the climate is particularly suitable to it. The cultivators are Chinese, who sell their produce green for distribution through the country round. They grow it in ridges, in the accepted way: and it is on the ground 8-9 months. What their yield is, I do not know, but it should be 4,000 lbs. per acre. The Javanese grow ginger for the supply of that island.

Cardamoms can equally well be grown: not the greater cardamom—*Amomum subulatum*—but the lesser cardamom—*Elettaria cardamomum*. It was grown in the Botanic Gardens, Singapore, in 1875, with the idea of turning it into a crop and it is known to have fruited. It is cultivated in two varieties in Java. It requires rich soil and the proper place for it would be stream banks at the foot of hills. Twenty years ago the planters of Ceylon took up its cultivation for export and soon flooded the limited market. It is not for export that I suggest it, but to cancel our import.

The Curcumas, *C. longa*, Turmeric, and *C. Zeodaria*, Zeodary, can be grown in the Peninsula without difficulty to the complete meeting of the local demand. The first requires a little care, but the second is absolutely at home. They require similar treatment to ginger.

The tamarind fruits most unsatisfactorily in the south of the Peninsula; and as to the north I have no data. But in Java it fruits; and a supply is available for export. As it is quite a good roadside tree, it might be so planted with the chance of it being also remunerative by fruiting.

Vegetables.

Vegetables may be divided roughly into greens and roots, with this important difference that greens will not travel as a rule and roots will. In consequence of the ability of roots to travel

we obtain a supply of them from overseas more easily than we obtain a supply of greens: and therefore we are in a measure with something corresponding to tariff protection spread over the latter.

Foremost of roots is the potato, a truly great plant, which originated in the Andes of South America, and was only spread thence by the help of European voyagers because they were the first travellers from its temperate home who crossed the too hot tropics to other suitable temperate parts of the world. I have spoken of the difficulty of arousing an interest in maize as being in the cooking. The potato, despite its excellence, suffered on its arrival in Europe from the same disadvantage of unfamiliarity: and it was a century and a half before it really displaced the wheat dumplings which were the accompaniment to flesh when it first crossed the Atlantic. After a time it was brought out to India, and in the north grown as a cold weather crop, or in the hills in summer where it now extends to 9,000 feet. It penetrated, at some date unknown to me, to Java; and it is grown now at 5,000 to 7,200 feet. It is in the Philippine Islands, and has become a very important article of food among the mountain tribes of Luzon: but it cannot be grown satisfactorily at low elevations and particularly in the Southern Islands: so that at 3,000 feet in Mindanao the State has thought it desirable to make an attempt to raise enough for the European population.

The races of potato in the East are several and they ripen some in as little as 80 days and others in as long as 150 days.

But even taking the quickest there appears to be no reasonable hope of raising crops in the plains of Malaya, so that, as in Java, the places from whence we could provide ourselves are on our hills: and there would appear to be no difficulty in finding areas near markets quite suitable. In 1896 a 70-day race was raised in Penang, but was diseased. Excellent potatoes have been raised above Taiping.

For the lowlands there are available several substitutes for the potato—*e.g.*, the greater yam, *Dioscorea alata*, the African yams, the tapioca plant, the taro, *Alocasia*, *Colocasia*, *Amorphophallus* and the yautias (*Xanthosoma* spp.). Most of them yield more heavily than the potato, but they are on the ground for a much longer time. The outturn of potatoes at five to six months in England is about 8,000 lbs. per acre, and in a few extremely favoured localities up to 13,000 lbs. The outturn of *Colocasia* after as long a period is about 6,400 lbs., of *Alocasia* somewhat more, of *Amorphophallus* 8,000-16,000, of the *Dioscoreas* in nine to ten months 20,000 lbs., and of tapioca up to 25,000 lbs.; but the period of tapioca may run to over a year.

The Malays eat a good deal of tapioca, and grow it for the purpose, so that the cultivation needs no advertising and the Peninsula takes no imports. But I mention the plant here because, to the best of my knowledge, the trial of only a very few of the very

numerous existing races has been undertaken. Generally, through the East are 2-4 races: but Travancore is said to have as many as 20, and there are 40-50 in Brazil, with a still greater variety in the mountain-valleys of Colombia. In 1886 and 1889 several were introduced into the Botanic Gardens, Singapore, but what became of them is not to be ascertained.

Many people, by confused thinking, blame the tapioca plant for the lalang wastes, instead of the system of land tenure which led to them. Tapioca has done right well for this country: and it is such a robust plant, that exhaustion of the soil must follow heavy cropping with it. Praise it for its robustness and protect the land for future generations.

Colocasia antiquorum is quite a widely grown crop: it is a very important crop so near Europe as Madeira. It is also wild in the East: and from the inedible wild plant there runs a fairly complete series of transitions to the edible cultivated plant, of which there are several races, some specially suited for making into puddings, others used as bread is used, and others boiled as a vegetable. The Chinese call it *Yu* and rely very largely on it in their own country. The natives of India also use it freely. Therefore if produced here, it should hold a place in the market.

Alocasia indica is used through India like *Colocasia*: it is cultivated sparingly in the Malay Peninsula, and apparently, rather more so in Java. *Alocasia macrorrhiza* is like a large edition of the last, more truly tropical in the climate which it prefers, and so a little more cultivated in these parts than *A. indica*.

The *Xanthosomas* are American plants, not yet used as crops in the East, though promising as far as their garden cultivation goes. There are three well known—*Xanthosoma sagittifolium*, *X. atropurpureum*, and *X. violaceum*. The Bureau of Agriculture of the Philippine Islands is experimenting with them.

Amorphophallus campanulatus, the elephant's foot yam, furnishes a food largely used in India, but not in the Malay Peninsula. An ally, *A. Konjac*, is cultivated by the Chinese in their own country.

On *Dioscoreas* I have been busy experimenting for some time. I know that I have got better races than those which appear in the local markets. I know that they are easy to grow. But as with maize, cooking is the local obstacle to their general adoption.

The Jerusalem artichoke can be raised easily in the Malay Peninsula, but not with full vigour in the plains. Cantley used a good expression as regards onion cultivation which applies to the artichoke too, namely, "it is more or less worth cultivating."

Radishes develop too much pungency in the plains just as their relatives the rapes do in India. Carrots have been made to produce fleshy roots in the plains, but never to produce excellent ones. Beetroot has been got to do fairly well.

All the last four, the artichoke, the salad onion, the carrot and the beet, might be produced commercially on hills that are near to some of the larger markets. The true spinach and that excellent little cucurbit the cho-cho, might also be produced payingly in the same places. Endive could be grown too.

In the genus *Brassica*, the Chinese cabbage is the only one really suited to the plains: but it is inferior to the European members, of which the cabbage, the brussels sprout, the knol-kohl, the turnip and the kohl-rabi appear likely plants for the hills only. But mustard and cress might be grown anywhere if the hills could produce the needed seed.

There is no difficulty in raising lettuce, and watercress.

Tropical spinaches are easily found: and one, *Basella alba*, might very well be common in estate gardens. *Amarants* can also be raised easily for spinach, and are better than the kangkong (*Ipomoea aquatica*) which the Chinese cooks serve up. Beet leaves can also be used for spinach; and there is a Javanese spinach, *Talinum verticillatum*, which is not used in the Malay Peninsula.

I pass to those vegetables, which are at the same time fruits.

Peas cannot be expected to succeed on the plains, but do well in the hills. There, and in the plains as well, French beans can be raised. But better for the climate of the plains are *Dolichos lablab*, *Vigna catiang*, *Cajanus indicus*, and *Psophocarpus tetragonolobus*. The last named, I consider, at its right age, a most excellent vegetable. The first named, in one of its best races, is a table vegetable in France: but its worst races are, about maturity, dangerous.

Of Cucurbits, I believe that all the following can be grown if means be devised to protect the fruit from the little fruit flies, *Benincasa cerifera*, the wax gourd; *Cucumis sativus*, the cucumber, *Cucurbita melo*, the melon; *Cucurbita pepo*, the pumpkin; *Cucurbita maxima*, the gourd; *Cucurbita moschata*, the musk melon; *Citrullus vulgaris*, the water melon; *Luffa acutangula*, the loufah; *Momordica charantia*; *Lagenaria vulgaris*, the calabash; and *Trichosanthes anguina*, the snake-gourd. The Chinese raise some in paper bags and those generally of inferior races with firm skins. Just as the papaya protects its fruits by a milky juice, so may it be possible to prevent the attacks of the fruit fly by chemical means.

The tomato and the brinjal can be so readily grown that no more need be said of them.

Vegetables repay rich soil so well that the chief problem in regard to them is manure. Near our larger towns every hollow of good earth is likely to be given over to them, and a better use there could not be. Pig fattening brings a certain supply of manure to the market gardeners who till them: but manures generally are here costly: so that a limit is put to our supplies by reason of the difficulty of getting, and maintaining when got, the fertile soil

required. The difficulty is greater in the hills but I believe something could there be done on a small scale by means of branch-wood manuring.

Fruits.

The treatment of fruit in the Malay Peninsula is disappointing. Formerly when the plantations were fewer and isolation was greater, the owners found time to plant fruit trees near their houses: but until again quite newly there has been none of this done. In the towns men come and men go, having acquired no more knowledge of the fruits of the land than another alien—their Chinese cook—imparts with a spice of his own interest. Fruit growing is, I think, far behind what it should be.

The typical fruit of the country is the durian, borne on a tree of forest size and armed against bats, birds and squirrels. Its counterpart of the Amazon forest is the Brazil-nut, alike borne on a big tree and heavily armoured. The durian can take care of itself: nor does it need encouraging in the way that many other less gross fruits do.

The fruits suitable to the Peninsula are so many that I cannot give time to them severally: I propose instead to give a list of them, both those for the native and the European customer, and then to end with remarks on a very few. I shall divide the list by the size of the plant that bears the fruits.

(i) Trees of some size—

Aegle marmelos, the bel;
Artocarpus incisa, the bread-fruit or sukun;
Artocarpus integrifolia, the jack;
Artocarpus gomeziana, the tampang;
Artocarpus lakoocha, the tampang manis;
Artocarpus polyphemia, the chempedak;
Baccaurea motleyana, the rambai;
Baccaurea parviflora, the setambon;
Baccaurea malayana, the tampoi;
Bertholletia excelsa, the Brazil-nut;
Canarium commune, the kenari;
Diospyros mabola, the mabolo;
Eugenia aquea, the jambu ayer;
Eugenia brasiliensis, the Brazil cherry;
Eugenia malaccensis, the jambu bol;
Mangifera foetida, the bachang;
Mangifera indica, the mango;
Mangifera odorata, the kuwini;
Nephelium lappaceum, the rambutan;
Nephelium malaiense, the mata kuching;
Nephelium mutabile, the pulasan;
Sandoricum indicum, sentol;
Sandoricum radiatum, the kechapi;
Terminalia catappa, the Bengal almond.

(ii) Lesser trees—

Achras sapota, the chiku;
Anacardium occidentale, the Cashew-nut;
Anona muricata, the soursop;
Anona reticulata, the custard-apple;
Anona squamosa, the sugar-apple;
Averrhoa bilimbi, the blimbing;
Averrhoa carambola, the carambol;
Bouea macrophylla, the kundangan;
Bouea microphylla, the ruminiya;
Carissa carandas, the carounda;
Citrus aurantium, the orange;
Citrus acida, the lime;
Citrus decumana, the pomelo;
Citrus medica, the citron;
Citrus limonum, the lemon;
Eugenia uniflora, the pitangi;
Ficus carica, the fig;
Garcinia mangostana, the mangosteen;
Lansium domesticum, the duku;
Psidium gujava, the guava;
Psidium acre, the little guava;
Persea gratissima, the avocado pear;
Spondias dulcis, the Otaheiti apple;
Spondias mangifera, the hog plum;
Vitis vinifera, the grape;
Zalacca edulis, the buah salak;
Ziziphus jujuba, the jujube.

(iii) Large sub-herbaceous plants—

Carica papaya, the papaya;
Cyphomandra betacea, the tree tomato;
Musa spp., the plantain.

(iv) Climbers—

Passiflora edulis, the passion fruit;
Passiflora laurifolia, the buah susu;
Passiflora quadrangularis, the grenadilla.

(v) Herbs—

Ananassa sativa, the pineapple;
Hibiscus sabdariffa, the rozelle.

The list includes dessert and stewing fruits. It includes two plants suitable only for the hills, *Cyphomandra betacea*, the tree tomato, and *Passiflora edulis*, the passion fruit.

It includes a few plants which cannot be produced commercially, notably the grape and the fig, but which can be grown as toys with care. It includes several trees which are suited to places such as Malacca and Kedah, but not to Singapore, and probably not to Selangor. Out of the complete list some which are little

grown, but particularly recommendable, are the carounda, the carambol, the ruminiya and the rozelle—all for stewing, and the Brazil nut, Brazil cherry and Avocado pear for eating. Of many of the trees, there are far better races than those commonly grown, the rambutan is a case in point, and so is the duku. Selection work on these is in hand at Singapore. The mabolo is worth planting: but it is to be remembered that many trees are male only.

For our horticultural establishments, lines of work of much promise appear in the improvement of the fruits of the genus *Citrus* and the genus *Anona*. It is desirable to experiment with stocks and grafting: it is desirable to establish in the Peninsula recognized races from grafted stock, a line of work hardly touched as yet. The men able to help in this are pre-eminently the planters.

Concluding Remarks.

My paper has been, of necessity, somewhat discursive; and therefore, in concluding it, I shall draw a few thoughts together in order to give them prominence.

This country is a new one: and the newness brings disadvantages as well as advantages. Compared with India it is, as I once heard an eminent American scientist say, as fresh air to an overpopulated house which wants airing. Though a house be overpopulated, it is at any rate with the necessities of population in it. The variety of produce in India comes from the long time that it has been lived in, and the consequent artificial surroundings, the most obvious of which is that field has been joined to field, and the woodland cleared. It is generally accepted that this means a change of climate, which makes the ripening of crops somewhat easier: from which comes the deduction that without our forests, without our light airs and frequent precipitations, many of the crops of India and many fruits would perfect themselves better than now. But that gain would, I think, involve a loss of considerable magnitude. Consider the whole world; and you find in it less land surface with the moist calm air which rules here, than with the alternation of dry and wet seasons. Should we then wish to enter the hurly-burly of the heavier competition?—not if there are enough paying crops suited to the rarer condition. Our best, rubber, is one such; tapioca is another, and more could be quoted. I believe at present, that the interest of the whole Peninsula lies in guarding the climate jealously: and for that purpose our mountain forests are essential. We do not want extensive planting over them as in Ceylon, nor the clearing of them by grazing as on so many of the Indian mountains, nor the wanton wandering cultivation that has made the grass lands of tropical Africa. But for our own food supply it would be quite well to anticipate a certain amount of production upon them; and it is not waste to experiment with European vegetable production in hill-gardens.

As to production on the plains, rice demands first attention, not only as the most important, but because successful rice growing draws other crops after it as members of rotations. For its increase, the north of the Peninsula appears to be the region of results. And towards such an end State aid as regards irrigation and pest suppression appears justified.

For fruit culture, Malacca has always appeared to me one place where good might come of efforts expended. The country side there is nearly full; an approach to Indian conditions is being realized: there is already an export trade: roads, if not for joy rides, are abundant and transport backwards and forwards is easy from all parts.

The vegetable proposition hangs too much on the need of good soil, manure and near markets, to admit of particular localization. It is for all parts of the Peninsula.

To reduce our bill for condiments appears a little more difficult: and to reduce that for sugar impossible.

FOOD-STUFFS IN MALAYA.

By F. G. Spring, N.D.A., F.L.S.
(*Agriculturist, F.M.S.*)

THIS paper is written with one object and that is to endeavour to stimulate interest generally in connection with the growing of food-stuffs in Malaya. There are very large areas in cultivation, here, but the part devoted to food supply is, in comparison, almost conspicuous by its absence. The European planter does not appear to have seriously considered the growing of such crops and it is evident that the Eastern races have, to some extent, ceased to practise what was, but a few years ago, their livelihood. It is surprising how few residents take an interest, in the subject, even as far as a vegetable garden is concerned and food production on estates, to a minor or any extent, for one's own labour force is, I believe, unknown. The cooly is not the one to further the growing of such crops. He may have his small plot of land but further than that he cannot be expected to go. The smallholder, particularly the padi planter, is the main support of what food materials are produced in this country and it is desirable that he should receive every encouragement. The larger planter has often opportunities of growing quite a variety of crops which would be of general benefit. Young rubber and coconut clearings, in the early stages of development are suited, in some cases, for the growing of food-yielding crops of short duration. I am fairly confident that a new clearing can support one or perhaps more annual crops, which take a matter of a few months to mature, without, to any appreciable extent, injurious results to the permanent crop. The culture and tilth required for the reception of a temporary crop, in many cases the primary tillage of the land, would I believe, compensate for the chemical constituents removed from the soil. In addition to this, the refuse material will, on application to the land, improve the mechanical condition of the soil which is of great importance, particularly in the tropics. I do not wish it to be understood that I favour the continued removal of one or a rotation of intercrops but I do think that short lived catch-crops might with advantage be grown, for a time, on first class land which is free, or comparatively so, from timber.

Many uncultivated pieces of land in, or adjoining estate areas might be profitably utilized for the growing of food-yielding plants of a more permanent nature.

The labour required for the proper culture of such crops is perhaps the most serious obstacle, for estates do not generally have a superfluous stock of coolies. Annual crops of this nature require more cultivation than is usual with rubber and coconut plantations. A good deal of supervision, particularly during the planting and harvesting seasons, is necessary.

The writer is well aware that this branch of agriculture is not attractive to planters as a class, but this is, in all probability, due to the all absorbing interest of rubber cultivation rather than to the knowledge gained from practical experience, as to the possibilities of such crops.

I now propose to deal briefly with a number of food-producing plants which can be recommended if immediate production of food-stuffs is required.

Maize.

This cereal is of great value as an article of human food. The ripe grain is used for the production of flour and meal. The green cobs form an excellent vegetable. In rubber or coconut clearings, not exceeding two years old, I see no special objection to the cultivation of this cereal. Hickory King and a red grained Malay variety have given fairly good results here, but I do not think it can be expected that our yields will equal that of India or Ceylon. Maize requires moderately rich soils and may be grown two or three successive seasons on the same plot. In this country it probably does best in land recently brought under cultivation which has a good proportion of humus in the soil and is friable in nature. Poor soils, stiff clays and sour lands are undesirable. A thorough preparation of the land is considered essential for the production of large maize crops but with virgin land, as it would be mostly grown on here, this is not so necessary, at least for the first few crops. The land may be changkolled or forked to a depth of a few inches and the seed sown broadcast, after rain, on a well prepared surface, at the rate of 10 to 15 lbs. per acre, as a sole crop, and lightly turned under; a fine surface tilth is of primary importance. The seed may also be dibbled in at distances of 6 inches in rows which are 3 feet apart and thinned out, when the plants are well established, to 12 inches in the row. Surface weeding is continued and care taken not to disturb or break off any of the roots. Weeding might be done, during the time the crop is on the land, slightly deeper than is usual, in order to retard soil evaporation. The crop takes three to six months to mature depending on the variety and the conditions under which it is grown. If the cobs are required as a vegetable they are pulled while green, otherwise the cobs are left until the leaves surrounding them become shrivelled. Proper drying and storage of the freshly harvested crop are of very great importance as the seeds are most liable to weevil attacks.

In several respects maize lends itself as a catch-crop. In the first place it is an annual, which occupies the land for a few months only, and this is an important attribute as an intercrop with young rubber. It is possible to continue the ordinary estate weeding and permits of periodic deep cultivation if required. The remaining stubble when changkolled into the land would improve considerably

the mechanical condition of both light and heavy soils and this combined with the improved tilth should compensate for the material removed in one or two harvests. This would apply to other cereal crops but not to the same extent with root crops. The growing of this cereal, or others mentioned below, might be seriously considered by those who have the necessary requirements for their proper culture. I might add that the Department of Agriculture will be pleased to assist as regards procuring of seed and advice as to planting.

Rice.

I do not propose to deal with this cereal as its importance in Malaya is well known but I would like to mention that hill padi and other native food crops, such as millet, Job's tears, etc., open up more possibilities than has hitherto been supposed.

Job's Tears.

Thrives well in this country and is cultivated to some extent by the Malays. The grain of the cultivated variety is said to be sweet and wholesome and amenable to ordinary methods of milling. Certain forms of the grain are roasted, then husked and eaten whole and used to some extent as a substitute for rice.

Millet.

A fairly good crop from a small area of the common millet was harvested at the Kuala Lumpur Government Plantation. The seed is sown broadcast on prepared land and lightly covered. The crop takes about four months to mature. The grain is considered digestible and nutritious and is eaten whole, being cooked like rice.

Ground-nuts.

The Spanish pea-nut, small Japanese, Senegal, Mozambique and Tambo ground-nuts have been experimented with at the Kuala Lumpur Government Plantation at different times with varying degrees of success. The time of sowing and harvesting are most important factors as regards yields. Planting must be done during a wet period but at such a time that the plants reach maturity in the dry season. I may safely say that a good yield will not be obtained should the crop be lifted during the wet season, the seed at such a time is not fully ripened and most subject to rot. Harvesting in dry weather is essential. Previous to sowing, the land requires to be lightly forked or changkolled, but not too deep, as the nuts would then be liable to be formed at a greater depth and thus increase the cost of lifting. The nuts are shelled and the seed sown at distances of 18 inches apart each way. Personally I favour planting on ridges as I think a more reliable and constant crop is obtained than on the flat, the nuts are not so liable to rot and the cost of lifting is less. Little after-cultivation is necessary beyond surface weeding but this must be carefully done, so as not to interfere with the nuts which

are developed at a small depth under the soil. Three to five months, according to variety and nature of soil, are required to produce a crop. A light friable soil is best suited. The nuts are collected when the leaves begin to wither. If the seed is to be kept for any length of time it must be well dried in the sun before being stored. The Bambara ground-nut, the fruit of which is somewhat similar to the ordinary ground-nut (*Arachis hypogæa*), did very well and is perhaps more suited to this country as it is not affected to the same extent by seasons. Ground-nuts may conveniently be grown as an intercrop.

I will now refer to a number of root crops, the cultivation of which is sadly neglected here. It is surprising that residents who have in most cases every facility for growing them do not as a rule produce such foods for their own tables, particularly those any distance from a market.

Yams.

Some 20 varieties of yams were introduced from India, Ceylon and Barbados and experimented with by the Department. I have no hesitation in stating that they can be successfully grown in Malaya; the weight of individual tubers compares favourably with those of other countries and no special difficulty is experienced in their culture. Suitable soils are sandy loams but deep cultivation and good drainage are more important than quality of soil. The land should be forked or changkolled to a good depth in order to enable the tubers to develop properly. The soil is then put up into ridges 3 to 4 feet apart and the seed tubers planted on the ridges at distances of from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet depending on the variety. The object of raising the ground is to ensure better drainage, to do away to some extent with deep trenching and to make the conditions for lifting the crop more easy. In this country planting could be done at any time but the wet season might be taken advantage of. Near each plant is placed a stick for the creepers to grow upon. The stick should be from 12 to 16 feet high. A common practice is to plant up trees for support. It is not uncommon to allow the plants to trail on the ground but this method is supposed to decrease the yield slightly. The crop takes from nine to eleven months to mature. At the end of this time the leaves become brown and drop, and the stem dies down; this indicates that the tubers are ready for lifting. The tubers should be lifted as required, as they do not keep long when exposed to the atmosphere, but when left in the ground they keep for quite a long period. The yields depend on the variety grown, suitability of soil, cultivation, etc., but generally speaking it varies from 4 to 10 tons per acre, approximately the same as the yield of potatoes. In Malaya, yams are seldom if ever seen, but in the West Indies, particularly, they form a standard diet both for Europeans and natives, the latter living largely on this food. Being more nutritious than the potato they form one of the most

important foods of the tropics. In several countries they take the place of the potato and are considered by many people superior to it. They have been frequently recommended for extended cultivation in India in times of famine as they are not affected by long periods of dry weather. In such countries as Malaya, where a large proportion of the population is almost entirely dependent on the rice crop for their food, yams might, when the price of rice is high, partly serve as a substitute.

Sweet Potatoes.

These are often looked upon as yams but this is not the true use of the word. The type of soil and the depth of cultivation required are similar to those for the yam. They may be grown on flat ridges 3 feet apart. The stem cuttings are planted on top of the ridges at distances of $1\frac{1}{2}$ feet, but when grown on the flat the cuttings are placed 2 feet apart each way. The tubers may also be used for propagation purposes but the former is the general method. The crop is best lifted during dry weather.

Jerusalem Artichoke.

This root crop, which is easily grown, does exceedingly well in Malaya and gives very good yields, probably as large as in any country. The soil is deeply cultivated previous to planting and maintained clean during the period the crop occupies the land. The best time for planting is just as the young shoots are appearing on the tubers and is done at distances of 2 feet. The crop takes from three to four months to reach maturity. The tubers are ready for the table when the leaves begin to wither and dry. The plants thrive well in most situations but preference should be given to reasonably rich soils.

Vigna Catjang.

This bean has for a number of years been successfully grown at the Kuala Lumpur Government Plantation. There are several forms of the plant, the one commonly grown in this country by Chinese market gardeners has long pods and is often sold as a substitute for French beans. The crop is ready for collecting in about two and a half months. It does well on light alluvial soils or loamy lands. When cultivated on a small scale it is generally grown in prepared nursery beds, the seed planted in rows 18 inches apart, the young plants being trained to grow upon sticks, two or three plants to each stick. In India the seed is sown broadcast on prepared land.

Tapioca.

Tapioca has been grown fairly extensively in Negri Sembilan and Pahang in the past few years, the export from the former State during the years 1914 and 1915, being 21,585 pikuls and 17,235 pikuls, respectively. If grown for any length of time on the same area, manuring will ultimately have to be resorted to as a means of securing good yields and for this reason it is best grown as a sole

crop. In Pahang it is cultivated fairly extensively as a catch-crop amongst young rubber but I am extremely doubtful if this is to be recommended. Tapioca is propagated from stem cuttings, 6 inches long, the cuttings being half buried in the soil in a sloping direction at 4 feet distances. The crop takes about one year to reach maturity.

Sugar-Cane.

I merely wish to refer to this as a food substance which was extensively grown in Province Wellesley at one time and to a smaller extent in other parts of the country. The growing of sugar-cane as a plantation crop here is now non-existent but it is cultivated to a minor extent, especially by market gardeners.

Sago Palm.

This palm is a native of Malaya and yields the sago of commerce. It is found chiefly in swampy flat situations and is particularly common in some parts of Perak and Negri Sembilan. There are fairly extensive areas where this palm would flourish and which perhaps, with the exception of padi, are unsuited for other tropical products.

Fruits.

Before closing this address I would like to refer briefly to the question of fruit culture. This important branch of agriculture is largely ignored by the European planter. There are a considerable number of fruits which flourish here, but few private gardens have anything like a representative collection. Suitable lands in the neighbourhood of the larger towns might be profitably utilized for the growing of fruit trees for I feel sure that a ready market would be secured.

The following fruits can be successfully grown in Malaya—custard-apple, bullock's heart, soursop, cherimoyer, mangosteen, roselle, durian, blimbing, carambola, pumelo, lime, citron orange, langsat, duku, rambutan, pulassan, avocado pear, chiku, *Passiflora laurifolia* and papaya. The following fruits show some promise—Java almond, Cashew-nut, pomegranate and wood-apple.

Vegetables.

The following vegetables are worthy of extended cultivation—lettuce, endive, kohl-rabi, snake, bollh and wax gourds, cucumber, tomatoes, spinach, carrot (short horn varieties) *Coleus tuberosus*, brinjal, yam-beans and arrowroot.

Discussion.

The Chairman (Mr. L. Lewton-Brain) offered a few remarks at the close of the paper: After regretting the small attendance of planters at a discussion of such importance, he pointed out that the subject could be divided into two parts: first the growing of vegetables by individuals for themselves and second the general food supply of the country. Far too few planters grew their own

vegetables or planted up fruit trees. It was perfectly easy to do so, but it certainly required personal attention. The question of the general food supply of the country is of great importance not only to the Government but also to the planting community as large employers of labour, which is dependent for its food on imported supplies. Taking the staple food of the country, rice, approximately three times as much is imported into the Federated Malay States annually as is produced; the figures are roughly 60 million gantangs imported, against 20 millions produced. The Government is doing a great deal to increase the food production by smallholders, particularly by the bringing under irrigation schemes areas suitable for the cultivation of padi. Experimental work now being carried out by the Agricultural Department promises to lead to considerable increases in yield from the areas at present under cultivation. These efforts, however, could not be expected to produce immediate results and at the present time the difficulty was to maintain the area under padi at its present level; the cultivation of rubber has made the smallholder so prosperous, that he is not anxious to undertake the more laborious and less profitable work of growing padi. Could not more be done on and by estates to increase the production of food-stuffs? In all other countries, he had worked in, where there was a resident labour force, on estates, the labourers grew most of their own food-stuffs. In the West Indies, for example, the negro labourer grows his own sweet potatoes and yams, so that some fish and a little pork occasionally is all he needs to buy. In this country there is practically nothing of the sort done at all and the estate labourer is entirely dependent on imported food. As Mr. Spring has pointed out, there are many kinds of food that can be grown here and probably in course of time will be grown. It is, however, not a healthy state of affairs that an agricultural community should be content to go on depending on imported food to such an extent. He was hoping to-day to raise a discussion that would show whether something could not be done to improve matters on estates as regards food production, what the difficulties were and how they could be dealt with. It was regrettable that the small attendance would rob the discussion of much of its value.

Mr. B. J. Eaton, Agricultural Chemist, said that the subject was as interesting as it was important to them all. But in view of the small attendance that morning he thought the question should be raised whether some means could not be adopted by which a greater interest could be aroused in the matter. He did not think that, in view of the extent of the many estates they had, there would be any very great difficulty in setting aside a small portion of land on each estate for growing at least a proportion of food required for the labour force on the estate. It was the planter who should take an interest in the matter, and it was through him that they could hope to interest others. He was aware that managers of estates

were unable to take action without the sanction of their directors. Especially at this time the problem was a very important one, and the time was very opportune to discuss it in the District Planters' Associations. (Hear, hear.)

Mr. Berenger, of the Taiping Gardens, in supporting what Mr. Eaton had said, remarked that he had for a long time taken an interest in the matter, not from the theoretical side alone, for he had been 10 years on rubber estates and knew the conditions of things. There was certainly a large number of products that could be grown. The ordinary cooly, as they knew, had no idea of even looking after himself, so that they should do these things for him. A small portion of land might be set apart and the cooly would very soon know what to do with it. Some assistance might, of course, be given in the form of fertilizers. Such things like basic slag and other chemical manures could not, of course, be got easily now, but there were some by-products, like coconut poonac and ground-nut meal, that would be very good.

The speaker described a certain experiment with this meal on lalang-ridden land which gave surprising results. Cattle manure in this country was not very rich, as it was usually exposed to the weather, so that such elements as phosphoric acid, etc., were washed away. He knew of some planters who said that they had even gone to the extent of buying cattle for the sake of the manure, but the results were not very encouraging. There was no reason why it should not succeed if they did it properly. Some of the bigger estates ought to go in for something in the nature of practical farming and they would find that it did not cost very much, nor would the labour required exert any great strain on their resources.

Mr. Pinching, after saying that there were several estates that used cattle manure, remarked that in regard to the growing of food-stuffs on estates he was afraid most planters would say that they had enough on their hands with rubber. He believed that some estates had made efforts of one kind or another but had not met with success. One estate even tried to grow rice but found that they suffered a great loss.

Mr. A. G. G. Ellis, Assistant Agricultural Inspector, spoke of an estate in Perak where the manager gave his coolies small plots and offered a prize for the best kept garden. The coolies became quite interested and excellent results were achieved. He had suggested the same thing to others, and he believed that it was being taken up.

Mr. Coombs replying to the query as to the possibilities of planters producing rice on estates stated that without wishing to in any way disparage efforts in this direction he felt that it would be of service to indicate the following points: (*a*) That dry land padi is essentially a "first crop" from newly-felled jungle land or from

land which has had time to recover by fallow or rotation of crops. (*b*) That it is not tolerant of shade. (*c*) That it must be planted in fairly large areas to minimize the depredations of pests. (*d*) That planting has to be timed to catch the rains. (*e*) That the yield to be obtained under the best of conditions could be estimated at 300 gantangs of padi per acre—*i.e.*, approximately, 150 gantangs of rice, which on the basis of six gantangs of rice per cooly per month worked out to the index of one cooly consuming the produce of half acre of land. He stated that he had an open mind about the matter but that any success would he thought be largely dependent on the extent of co-operative effort. Turning to the question of wet rice he could not express optimism concerning the results to be obtained from planting "wet-rice" in swamps. He stated that the only way to make swamps produce a satisfactory crop was to make conditions such that the land might be swamp no more. He showed how certain areas in this country produced rice in quantity per acre second only to Spain and indicated the ways by which production could be still further increased.

Another speaker remarked that fruit cultivation on estates was difficult, owing to the theft of fruits by coolies when the fruits came to maturity.

The CHAIRMAN said that Mr. Spring's paper was prepared in order to get the views of planters as to whether it would be possible to improve conditions, but as so few planters were present, he did not think it was any use continuing the discussion. He would therefore call upon Mr. R. W. Munro to read his paper on "Liberian Coffee."

THE CULTIVATION OF LIBERIAN COFFEE.

By R. W. Munro,

(*Managing Director, Morib Plantations, Selangor, F.M.S.*).

THIS paper is written principally with a view to encouraging other payable industries in this country (few other countries having equal advantages) submitting that the policy of giving general support to one product only cannot be based upon any sound argument.

No statistics are available regarding the area at present under cultivation, but the latest returns including all varieties give the figure of 2,268 acres on estates; this is probably interplanted with rubber or coconuts.

Since rubber has proved all along so attractive it is not surprising that comparatively little attention has been paid to coffee, but, if figures prove anything, the cultivation would seem hardly to have received the recognition that it might have done.

At the time when a good deal of attention was being given to it, and a very considerable amount of British capital invested, it was more or less acknowledged that quite a useful return on the outlay could be obtained with the price standing in Singapore at $22 to $25 a pikul (the cost of production being then about $12 to $15 per pikul). It should be stated here that the value of the dollar was about 3*s.* 6*d*. That the prices ruling during the boom from the years 1893 to about 1899 were 50 per cent. higher than the above, and also how it suddenly dropped to an unpayable figure have become matters of history, and there was hardly a planter in the country who was not badly hit. Prices rallied in the most unexpected manner later on, so that in the year 1905 coffee was in great demand again in the local market at $30 a pikul.

The original decline in prices was supposed to be due to the Santos valorisation scheme, and other causes unconnected in most cases with the question of quality, or of the actual supply and demand.

Planters got tired of being told that they were suffering because they insisted on producing a low-grade article, especially when it became known that whatever value was placed upon it as a beverage decocted from the raw material it was looked upon as being an absolute necessity to the commercial world for carrying out the usual trade methods, mixing it with Arabian, and other grades, and selling it as the finest "Mocha." Looking at the prices that have been ruling for some years past (it is quoted to-day at $45 per pikul) the so-called low grade article appears to command a considerable amount of respect.

It must be realized that at the time mentioned above, when this product was being exploited here, there was not a great deal of knowledge at the disposal of the planters as regards its economical cultivation. Most of the knowledge available was brought from Ceylon, where species other than "Liberian" had been in vogue, and to which this country was entirely unsuited, and we realize now, that a great many of those who encouraged the planting of Liberian coffee here, and who honestly believed in it, to the extent of risking, in some cases, considerable fortunes, hardly possessed sufficient knowledge either of the industry or the conditions necessary to make a success of the venture; they were at the same time attracted by big figures in consular reports from Brazil and elsewhere.

Planters of the present day would, we think, soon doom to comparative failure some of the propositions of those days when land was so often chosen for coffee without regard to the requirements of the tree itself. Land chosen in the Ulu containing, as we know, not a vast depth of "humus" was rarely dealt with in a manner calculated to conserve all its resources, and became, from one reason and another (mostly by allowing the top soil to be washed by heavy rains into the ravines) much impoverished, and actually in many cases incapable of bearing average crops after the first few years without the aid of artificial manure.

The best and steadiest crops were recorded from lands of a peaty nature in the low country, where the only coffee worth looking at still exists and is yielding a handsome profit to its owners.

It has been the aim and object of a large proportion of planters, since the rubber industry was started, to find something in the way of a catch-crop that would prove to be an assistance in reducing the cost of upkeep. Different varieties of coffee have been interplanted, and in many instances a very considerable revenue obtained.

One well-known company paid quite a respectable dividend for a few years waiting for the main product to mature, but generally speaking the policy of introducing catch-crops with the above idea cannot claim much support, and the scheme is for many reasons a dangerous one. It might be assumed that the planter would eliminate the catch-crop at any expense as soon as he is satisfied that the main crop is suffering, but, in the face of concrete instances, unfortunately no such assumption is warranted.

Again, the catch-crop as a rule receives little or no attention in the way of cultivation, and cases are recorded where coffee as a catch-crop with rubber has been condemned on account of the soil being described as unsuitable when it might have yielded quite a good return under conditions altogether dissimilar.

Under normal conditions a small crop may be looked for in the third year from planting and the tree may be considered to be in full bearing after the fifth or sixth year.

Dealing with the various works incidental to the actual cultivation in this country there would appear a necessity for many changes in methods that in former times were considered orthodox.

Planting Distance.

Planting distance in coffee, as in every other tropical product, gives rise at the outset to a considerable amount of discussion, the variety of opinions occasioned chiefly by the dissimilarity in soil conditions, situation, etc.

At whatever height the tree be topped, or even if it be not topped at all, the spread of the lower branches indicates the inadvisability of anything like close planting. Diametrical measurements of trees with specially vigorous growth have in some instances been given from trees topped at $5\frac{1}{2}$ feet showing as much as 20 feet across, but although under the most favourable conditions such a result over a large area is highly improbable, still, the adoption of a much wider distance than used to be considered correct is to be recommended.

The undesirability of allowing the lower branches to overlap, or even to meet, is very soon obvious when heavy blossoms and crops begin to be visible, and when the cooly, whether he be engaged in the works of weeding, cultivation, or gathering the crop, makes his way down the lines not only with difficulty but at the serious expense of the newly-set crop which is often destroyed in large quantities.

Should the policy of $5\frac{1}{2}$ feet topping be adopted, the distance for planting may reasonably be given as 15 ft. × 15 ft. or 12 ft. × 20 ft., the former giving nearly 200 trees to the acre, and the latter 180.

High coffee (untopped) has never been greatly in vogue in this country, though in Java and Sumatra the system has many supporters. It entails a great deal more expense in maintenance such as pruning, etc., ladders also are required for picking the crop, these are costly in manufacture and upkeep, and it is doubtful if proportionate results are obtained.

Selection of Seed.

There is just as much to be said in favour of careful selection of seed, as in other products; and it is unnecessary to state that the cherry should be perfectly ripe. In preparing for the nursery, care must be taken after the process of separation from the pulp is complete to mix well with dry ashes, and spread out in a warm place, not exposed to the direct rays of the sun. Deep planting in the nursery is a very ordinary cause of failure in germination; the seed need only be placed to a depth of 1 inch, but the nursery requires top-dressing with fine soil after heavy rains. A safe distance at which to place the seed is 5 to 6 inches apart, and a heavy attap shade is a necessity. Plants taken from the

nursery with four pairs of leaves, including the fish-leaf, withstand transplanting better, as a rule, than at a much later stage—*i.e.*, provided that the shade over them in the nursery has been previously lightened to allow of the necessary hardening.

In any event the process of transplanting is a delicate one, requiring much close supervision, especially to see that on a hot day the plants put in are not left for any length of time without shade, and the greatest care be taken to avoid a bent tap-root by cutting the exposed portion with a sharp knife before it leaves the transplanter.

Some six to eight months from planting, the young trees under normal conditions will require suckering, and also attention to the selection of the one stem on which the tree is eventually to be brought up. Seed at stake, if carefully handled, will give excellent results, and planting by this method is much to be recommended under certain conditions.

The time from blossoms to crop may be counted roughly as ten months and two heavy crops a year are as a rule reckoned on, May-June and December-January, when the estate, unless supplied during the year with more labour than is actually required, is sometimes hard put to it to maintain itself in good order, and to harvest the crop at the same time without loss. Pruning and handling will, all the year round, take up a large amount of labour and superintendence. The forcing climate makes it necessary to get in a round of pruning every two months; it should in reality be done every six weeks.

Shade Trees.

The prevalence of shade trees on nearly all the old coffee estates in the Peninsula was the outcome of a firm belief brought from other tropical countries where varieties of coffee other than Liberian were found to thrive better under certain forms of shade.

Here the climatic conditions, and those generally under which Liberian coffee is grown, do not appear to call for the same treatment and generally speaking the trees appear to do better without it, especially as we have yet to find a leguminous shade tree (no other varieties could in any case be recommended) that is not actually harmful in some degree by its tendency to get out of control.

Time and space in this short treatise will not permit of going into the various methods of curing and preparing the article for the market any more than it will of entering into anything like detail over cultivation, maintenance, soil conditions, and many other vital questions connected with the industry, but a rough outline of what is required for the treatment of the crop subsequent to the picking will act as a guide for the present.

Needless to say, the factory site should be chosen at a spot where an ample supply of water is available all the year round; the thorough washing of the beans after leaving the pulper playing

so important a part in the preparation for the market. First of all the choice of a really efficient pulper is very essential, although, at first it is not advisable to put down an expensive plant. The capacity of a single cylinder "Lidgerwood" pulper is sufficient to deal with crops from 100 acres, or more, and space should be left in the factory for extension, when supplementary machines can be manipulated by the same driving power. Selection of an economical running engine capable of working pulper, huller, and water pump is a matter of no little importance.

The situation of washing and fermenting tanks also is a question requiring careful deliberation. The practice of bringing unripe cherry into the store must be condemned at the outset because a crop in this form cannot be dealt with by any pulper and the result is a dead loss. The pulped beans are run into a fermenting tank, scuddled into a heap, covered with wet gunnies, and kept there for about 60 hours. This is the system mostly employed in Java at the present time.

If pulping takes place say at 5 p.m., the heap, to prevent over fermentation should be turned over the following day about noon and again covered; if this be repeated the following morning, the coffee can be thrown into the washing tank the same evening and remain soaking until the commencement of the washing process on the morning after. When a very thorough washing has been effected the coffee becomes what is known as "wet parchment," and is removed in bags or baskets to an open barbecue (or if artificial heat is used, to the drying house), where it is kept constantly turned over until the drying process is complete. The "dry parchment" is then dealt with by a huller which turns out the finished article, the only process remaining being the grading and sizing of the beans according to market requirements.

Pests and Diseases.

The cultivation of the product under discussion having as is well known, and as we have just remarked, gone almost entirely out of favour for so long a period, it is not possible even to conjecture what enemies are awaiting us should we once more decide to exploit it.

I think that we should at the outset assume the fact that while having the opportunity of gathering an amount of useful information regarding the industry in general from planters in Java who know that we should not enter the field as serious competitors, soil conditions preclude the possibility of its being carried on under exactly similar conditions as those obtaining in that country.

We possess none of that volcanic soil on this side, and the possibility presents itself that we might on this account be less immune from diseases; this is a question, however, for the scientist, rather than the planter, but requires all the same, a reasonable amount of deliberation.

In dealing with diseases of coffee we do know that leaf-disease is so pronounced and so universal that the plant is practically born with it. Young plants in the nursery, existing under any but congenial conditions will often suffer to an extent uncredited, and failing to respond to the usual Bordeaux-mixture treatment, wear a most distinctly worried look until isolated, as it were, in its proper place in the field. It is encouraging however to know that the plant, when once well established in the best surroundings, carries on as if no sickness existed, because, unlike so many of its relations, its constitution is strong enough to throw off the disease without the aid of artificial remedies.

The functions of its tap-root are such as to be specially intolerant of wet feet, so that it would be futile to engage in the industry at all unless perfect drainage can be obtained. Unlike rubber, the coffee tree, although possibly existing, can be of no use without its tap-root. A tree planted with a twisted tap-root will inevitably succumb to attacks of various sorts, as there is no provision apparently in nature to enable it to hold its own by the aid of its lateral roots only.

With the non-existence of the tap-root it matters little whether *Termes gestroi* or *Fomes* get to work or not because the tree is practically doomed.

Progress of science, and application of scientific methods have disclosed a very much wider field in a comparatively short period, and it is with this knowledge that I would advocate the necessity of embarking upon (what I may be forgiven if I term) a new industry with very different premises, and on lines of a broader nature than the old coffee planters were taught to work upon. I would say that clean-clearing of sub-soil timber will be a question for urgent discussion, and should receive the consideration that it deserves.

Touching lightly upon pests, no one who saw, and has been made aware of the damage done to estates by the caterpillar of the bee-hawk moth, would enter upon the cultivation with the idea that, given good prices, all would be well.

Assuredly this pest will make its apperance again, but the knowledge of remedial measures is more available now than it was, and for safety and insurance against the spread of this devastating pest I would strongly recommend that no large areas be planted without dividing-belts.

From the foregoing I trust it will be clear that the writer is in no way posing as an expert in the cultivation (I would say that with only superficial knowledge at our disposal we have yet to find one) but is actuated by the conviction that the prosperity of the country means prosperity for the individual, and if ever there was a time in the affairs of the Federated Malay States when everything should be considered with a view to its permanent prosperity it is now. No

one can deny us when we say that the country is an agricultural country and what possibilities are contained therein we have yet to discover.

Statistics of prices of Liberian coffee paid per pikul at Singapore during 1912 to 1916:

1912	January to June	nil.
„	July to December	$36.50
1913	January to June	39.00 to 42.00
„	July to December	39.00
1914	January to June	39.00 to 39.50
„	July to December	24.00 to 39.50
1915	January to June	28.00 to 40.00
„	July to December	28.00 to 37.00
1916	January to June	32.00 to 45.00
„	July to December	40.00 to 45 00

Discussion.

Mr. P. B. Richards asked Mr. R. W. Munro whether he did not think coffee robusta would do equally well as Liberian? He mentioned a plantation he had seen in South Perak where robusta was planted between the rubber over about 250 acres when the place was being opened. The manager was so satisfied with the result of this catch-crop that when opening up 250 acres more he interplanted this also with robusta. He knew that other small-berried varieties had been tried, but he was not able to say what success attended these. He did know, however, that coffee robusta had given very satisfactory results. Speaking of the diseases mentioned by Mr. Munro in his paper, he was sure efficient spraying methods would get them under.

Mr. Munro, in reply to Mr. Richard's question, said he was not prepared there to tell them much about coffee robusta, but he had known cases where it had been a success. His remarks on soils dealt with the question only from the point of the requirements of Liberian coffee and he was not familiar with the other varieties referred to. He had heard of a good variety which had been tried with success in Java where robusta was also tried, but he believed they were now giving preference to the Liberian variety there because they believed it to give a sound and confirmed crop. As regards the pest he had mentioned, he said it might shortly make an appearance, and he suggested that remedial measures would be adopted now, as the scientific methods now prevailing would make it easy to deal with such pests.

Mr. P. B. Richards remarked that another point was that Mr. Munro mentioned Liberian coffee as thriving on rich alluvial soils, whereas, the robusta crop mentioned was grown in the uplands, on laterite soil, not especially abundant in humus. He wished to emphasize that at least one grade of coffee would grow well on the uplands.

Mr. Munro thought there was very little doubt that the Liberian variety would grow in any soil provided it was good alluvial soil.

Mr. G. E. Coombs thought that in regard to the present value of coffee robusta people in Java had found that robusta gave best results, the only drawback being that it required some form of kiln drier to ensure the complete removal of the "silverskin."

Mr. Munro said that he had no details at hand in regard to coffee robusta but the prices of Liberian coffee per pikul for the past five years were as follows:—In 1912 the highest price reached was $36.50; in 1913, $42; in 1914 it ranged from $24 to $32; in 1915 from $24 to $40; in 1916 from $32 to $45.

Mr. Berenger remarked that they had a far readier market at Home for robusta than for Liberian coffee.

Mr. Munro spoke of planting seed at stake which, he said, had given good results under certain conditions. But he himself was in favour of young plants being put down. If they did plant seed at stake they must have the same shade as in the case of plants.

MINOR ECONOMIC PRODUCTS IN MALAYA.

By F. G. Spring, n.d.a., f.l.s.
(*Agriculturist, F.M.S.*)

CONSIDERING the very large profits derived from plantation rubber, in the past few years, it is not surprising that other crops, with the exception of coconuts, have received little or no attention. A planter knows, approximately, what may be expected from his rubber plantation and is, therefore, chary of growing a crop about which there is any speculation. As long as rubber remains about two shillings per pound or over, it is not to be expected that general interest will be taken in other directions, but should the price ever reach the neighbourhood of one shilling per pound, then capitalists would, there is little doubt, be on the outlook for other industries. It is satisfactory that many enquiries have been received, for some time past, regarding the cultivation of a number of crops, for it is greatly to be desired that other agricultural products be developed in Malaya.

A large amount of work is required to be done before a crop can, with any certainty of success, be recommended to the planting world. One must first inquire as to suitability in respect of soil and climate and then consider its possibilities on a financial basis. With small areas it is possible to make accurate records of when plants come into bearing, obtain yields, etc., in respect of each plant but it is difficult to say from individual yields, or even crops obtained from a few acres, how they will behave when planted on a large scale and to give costs of production, yields and probable profits with any degree of certainty.

On the Government Plantations we have experimented with many plants of economic importance, mostly on a small scale, but the more promising on somewhat larger areas, and I now propose to deal briefly with a number of the crops.

African Oil Palm. (*Elæis guineensis.*)

This palm has long been grown in Malaya as an ornamental plant, but it is only during the past few years that its financial aspect has been considered in this part of the world. The palm would appear, from its distribution in the Peninsula, to thrive on most soils, but a rich humus, fairly damp but well drained, would probably give the best results. Rainfall is an important factor but Malaya is well adapted in that respect. In Africa, according to some authorities, the palm comes into bearing in its sixth or seventh year. At the Kuala Lumpur Experimental Plantation several acres were planted up in December, 1912, and a number of the palms began to form fruits towards the end of 1916. Further evidence of early crop production, here, is also available from a number of

eight-year old plants which came into bearing in their fifth year. Records of individual yields have been kept for the past three years and these compare favourably with yields obtained in Africa, the home of the industry. It is stated that full grown trees in the Western Province of Southern Nigeria yield from two to twelve bunches of nuts annually; an average sized bunch contains at least 200 nuts and the weight of the latter varies from 7 to 21 lbs. The pulp of palm fruits contain about 60 per cent. of palm oil while the kernels yield, approximately, 48 per cent. of palm kernel oil.

The oil palm is propagated from seed. The nursery beds should be raised, made of fairly rich humus soil and near a water course if possible, to ensure the proper humidity of the soil. The seed may be planted about 18 inches apart each way at a depth of from 1 to $1\frac{1}{2}$ inches. The beds require to be artificially shaded and in dry weather regularly watered. When the seedlings are 1 foot high they may be transplanted into their permanent quarters which may be from 20 to 25 feet apart. Holing similar to that of rubber planting is greatly beneficial and tillage around the palm essential, if heavy crops are to be obtained. The palms require to be kept entirely free from other plant growth which is frequently found, particularly on the older uncultivated plants.

In West Africa the oil palm trade is handicapped by transport difficulties and lack of machinery. The industry is, more or less, in the hands of natives and as long as it remains so it is unlikely that there will be any rapid advancement. It has to be considered, financially, how a well managed property in Malaya with good transport facilities and modern machinery would compare with the somewhat primitive methods of West Africa. It might be mentioned that the world's demand for this oil is very large.

Fibres.

A sample of fibre, which would appear to be *Furcræa* sp., grown at the Kuala Lumpur Experimental Plantation and prepared by hand labour, here, was forwarded to the Imperial Institute, London, to be examined and was reported on as follows: The length of staple varied from 2 feet 8 inches to 6 feet, with an average of 4 feet 3 inches. The fibre was examined for tensile strength and elongation in comparison with a standard sample of sisal hemp and taking the East African sisal hemp as the standard, the ratios are as follows:

	Present sample.	Sisal hemp from East Africa.
Breaking stress	56 ...	100
Extension	225 ...	100

The above figures indicate that the present sample has only 56 per cent. of the strength of the East African sisal hemp but it is $2\frac{1}{4}$ times as extensible as the latter. The fibre was submitted to a firm

of merchants who valued it at £25 per ton in London, with sisal hemp at £26 per ton (December, 1913). It was further remarked that fibre of this quality would be saleable in large quantities for cordage manufacture and that a more valuable product could probably be obtained by extracting the leaves with modern machinery and brushing the fibre produced.

The following fibre plants, namely, *Furcræa* sp., Sisal hemp (*Agava rigida*, var. *sisalana*), and Manila hemp (*Musa textilis*) have been grown here with a considerable amount of success.

Manila hemp is propagated from suckers which are planted out at distances of about 8 feet. The first crop is collected when the plants are two years old. *Furcræa* and Sisal are propagated by suckers or bulbils, and may be planted out at distances of 10 feet each way. The plants come into bearing in their third or fourth year.

These fibres should not be interplanted with anything which provides heavy shade, but grown as sole crops in preference.

Ipecacuanha (*Psychotria Ipecacuanha.*)

This plant requires a great deal of care and attention but can, unquestionably, be successfully grown in Malaya. Specimens of dried root grown at the Kuala Lumpur Experimental Plantation were recently forwarded to London for sale and the under-mentioned note was received regarding the sample. "The result of the analysis, we may say, compares favourably with other results which have been reported to us. Prices for Ipecacuanha have fluctuated violently during the war and at one time Johore reached 17*s.* per lb. but high prices attracted unusually large supplies of Brazilian and values have fallen. The demand for this description was chiefly for Germany and has entirely ceased. Present value is about 8*s.* per lb." Propagation is by root, stem and seed. Root cuttings are made about $\frac{1}{4}$ inch in length and planted in a horizontal position in boxes containing 2/3 sand and rich jungle mould. The permanent distance of planting is 18 inches. Ipecacuanha must have shade throughout its period of growth. The plants are ready for lifting when two to two and a half years old and yield from 2 to 3 ozs. of marketable root per plant. The roots require to be carefully lifted, thoroughly washed, sun-dried and all foreign matter removed before being sold. Ipecacuanha can be grown as a catch-crop under moderate shade.

Chenopodium (*C. ambrosioides*, var. *anthelminticum.*)

This plant produces wormseed oil which is becoming of considerable importance on account of its use in the treatment of the disease known as American hook worm, or ankylostomiasis, and it is probable that there will be a fair demand in the near future. Seed was received from Maryland, U.S.A., in the beginning of 1916 and two crops have been harvested up to date. One lb.

of seed, mixed with 10 lbs. of fine sand, to facilitate ease of spreading, is sown broadcast per acre, on a well prepared surface. The plant reaches maturity when about three months old. The weight of unhusked seed worked out at 650 lbs. per acre per crop. It must be noted, however, that this yield was obtained as a sole crop, on good land. About one per cent. of oil is obtained from the seed. The present price of the oil is 12*s.* 3*d.* per lb. Chenopodium may be grown as a catch-crop as it is not affected by partial shade.

Cinchona.

About twenty acres of quinine, *Cinchona succirubra* and *C. Ledgeriana* were planted in March, 1914, on Gunong Angsi, Negri Sembilan, at an elevation of 1,500 feet. The plants are very fine healthy specimens and have shown excellent growth. Judging by the present condition of the clearing there seems every prospect that this valuable drug can be successfully grown on the hills in Malaya.

Croton Oil (*Croton Tiglium.*)

The nuts, obtained from this small tree, yield a medicinal oil which may be administered as a violent purgative. No special care is required in its cultivation. A small crop was harvested, here, when the plants were one year old and there seems every prospect of satisfactory yields being obtained when the plants are more mature. This crop grows on the very poorest of soils; it thrives remarkably well on light laterite and many waste lands could be profitably used in its cultivation.

There are many spices, drugs, oils, scent-producing plants, etc., which are receiving experimental notice but it is not possible to deal with them in this paper. I would like it to be understood, however, that a number of crops, other than those mentioned have shown some promise and that the Department of Agriculture is only too pleased to supply information regarding them and assist in any way possible to further the cultivation of new products.

Discussion.

The Chairman (Mr. L. Lewton-Brain) said he thought he might mention that recently the Penang Chamber of Commerce Committee had passed a resolution asking the Government to consider the question of establishing experimental farms throughout Malaya. This resolution had been sent by the Colonial Secretary to the Chief Secretary, who had submitted it to him (Director of Agriculture) and he proposed to bring it forward at the next meeting of the Advisory Committee of the Agricultural Department. He had been instructed to bring the matter up for discussion at that Conference. The matter fitted in well with what they had just heard, and he might take the opportunity to mention what the Federated Malay States Government had been doing in the matter.

They had Experimental Plantations at Kuala Lumpur and Batu Tiga in Selangor, and on Gunong Angsi, in the Negri Sembilan, where, apart from rubber, many other crops were being tried, including those mentioned in the resolution and many more. At Kuala Kangsar in Perak the Department had taken over the Government Plantation, though they were not doing much with it at present apart from the rubber plot. Before they could get at work on other experimental plots they required a good deal more of money and, also, what was more difficult at present, men for supervision.

Then they had a plantation in Kuala Pilah for Malay agriculture. The Kuala Kangsar Plantation was likely to be of very great use when they could develop their work on other products. Then, in Singapore, the Government of the Straits Settlements had the Botanic Gardens.

All these were very useful, and, indeed, indispensable to show what would, and what would not, grow; what diseases were to be looked out for; the conditions of growth; and what yields might be expected. But, if he might say so, all these were mainly of negative usefulness to prevent unnecessary waste of money as on the results of such small scale experiments they would be able definitely to recommend not to try this or that. But in the case of those products where promising results were achieved they required fuller information before recommending them commercially. They wished to know, for instance, above all, what yields could be secured over a given area, and what would be the actual cost of production to secure that yield on a commercial scale. These points could only be guessed at from small plots.

As a matter of fact these matters had been on his mind for some considerable time, and once they very nearly achieved definite results. In 1914 Colonel Fox, Mr. E. Macfadyen, and he drew up a scheme for a large scale experimental farm where products which had done well in a small way might be tried in blocks of 50 acres or 100 acres. He felt that such a scheme would give extremely valuable results. The scheme was submitted to Government and was approved in principle, and even a reserve was set aside for the purpose to the extent of about 2,000 acres, he believed. It was, however, postponed at the time as it was not possible to carry it further and since then it had not been possible to revive it.

He took it that now that the matter had come up in the form of the resolution forwarded to Government they were asked to discuss there whether they wanted more small scale experimental plantations or one or more of the larger ones.

Mr. R. W. Munro said: Those who have read (as most of you doubtless have) the last annual report of the Planters' Association of Malaya will have noticed a paragraph submitting that "a continuance of the country's prosperity must at all times be the main

objective, and the policy of fostering sound enterprises other than rubber should be an encouragement to those who realize the necessity for such a policy."

I believe it to be almost universally acknowledged that, apart from any special consideration for the increased prosperity of the country (which consideration, however, we know does exist secretly in the hearts of us all) other products, although not perhaps of so attractive a nature as rubber, would be welcomed only too gladly, could a satisfactory demonstration be given to the investor as to a reasonable return on the capital outlay. And I am convinced that hopes are more or less widely entertained by both planter and investor regarding the discovery and ultimate commercial success of some other propositions.

Now, perhaps one of the most interesting and astounding facts connected with the exploitation of rubber, which, as a payable industry, has now reached such vast proportions in this and many other tropical countries, is that in its early life a very large number of its supporters never pretended to claim any real belief at all in its possibilities. The whole thing was started as a pure speculation, as there were naturally no reliable figures to work upon.

The small point that you see I am trying to make is that we need not of necessity veto a new enterprise merely for want of figures as to its intrinsic merits. We will all, I think, agree that every new enterprise must be attended by a very considerable amount of risk, and I am quite prepared to believe that as time goes on numbers of people will be found to take risks, as they did nearly 20 years ago, and by doing so enlarge the sphere of planting possibilities, and continue to demonstrate what the resources of the country really are. Personally, I say, may I be there to see.

Mr. Pinching wished to know whether, if the products Mr. Spring had mentioned were taken up, a market could be found for them. He knew of a planter in Sumatra who had tried ordinary chillies and found that he got a good price for them. This induced him to take up his whole plantation and to put down chillies instead, but the good price had attracted others and when the produce was put out he found there was no market for it. (Laughter.) Such minor products were therefore very doubtful.

Mr. Spring said he quite agreed with Mr. Pinching about minor products, but if it was taken up on a small scale the Department would be able to know how much was planted up, and the knowledge gained would enable the Department to give such planters a warning note that they should not plant up any more.

Mr. Eaton believed that the proposal had been already accepted regarding experimental coconut plantations. He agreed that they did require larger areas in order to acquire information regarding

the commercial aspect of the question. As the attendance that morning was so small they would do well in leaving it to the Planters' Associations to discuss.

Mr. Berenger said that in regard to large experimental areas, he hoped they would be placed in charge of different men, as one man should not be given the charge of widely different products. It was only by specializing that the best results could be gained.

The Chairman: As there are so few present, I suggest that the Penang Chamber's proposal be passed on for discussion by the various Planters' Associations.

Mr. Munro said that the matter was of such importance that he, personally, was prepared to say that they might even go so far as to say that they might ask the Government to give no more first class land for rubber at all if that was going to be encouraged. But it was no use discussing the matter in that way if the whole thing was not going to be properly threshed out. He quite agreed that it was a matter for the District Planters' Associations now to take up, and he hoped they would discuss it at a very early date.

Mr. Coombs said that the resolution of the Penang Chamber of Commerce Committee showed a healthy sign of vitality in this country with regard to the development of agriculture. He felt that the subject should be properly taken up and discussed by the various Planters' Associations and that they should formulate a constructive programme.

Closing of the Conference.

Mr. R. W. Munro, a Vice-President of the Conference, said: We have now finished the last item of our programme and I would like to make a few general remarks, as Mr. Kindersley, although with us now, is still not well enough to be able to speak. It is unfortunate that Mr. Kindersley has not been able to attend any of the meetings we have had.

I think that I would like to say, on behalf of the planting community, a few words regarding the success of the Agricultural Conference. I may remind you that this inauguration of an Agricultural Conference, which is, we hope, to be an annual one, was not the result of a sudden "brain wave" at all. It is a scheme that has been talked about for a very long time. It was certainly about two years before the war started that Mr. Lewton-Brain approached a large number of us about starting it. Of course, there were many things that militated against it and rendered it quite impossible to set on foot so desirable an idea.

That the Conference has been a very decided success was very marked, I think, throughout. I think the interest taken in the papers is difficult to imagine. I believe the small attendance this

morning may be due to the fact that members were, as I may say, rather "fed up." But at the same time we see that by co-operation with the Government we have got to a certain point, and there is no doubt that the result of this Conference has been that we shall not only stand there but advance. (Applause.)

If the fact of the Government not having given official recognition to all these meetings be remarked upon, we might at least remember that it has been quite ready to help us up to a point. The Government has supported us and worked with us in a way that has been of extraordinary value to us as planters. If it was not for the Agricultural Department we would not have been able to undertake this at all. But the only hope that I can express—and I feel that I am also speaking for the planting community—is that I hope this is the first of a series of regular annual conferences. We should much like to see an annual Conference established.

I may also say that there has been a certain amount of criticism of the methods we have adopted. We have heard it said that it was not long enough and that we should have given more time to planters. But we may dismiss that straight away because what we meant to do was to make the inaugural meeting a success, and everything else did not matter so long as we got through that. I think that this is due to the support and the success of the efforts of the Director of Agriculture. We are very glad of the success of this Conference.

The Chairman (Mr. LEWTON-BRAIN) in conclusion, said: I must thank you Mr. Munro very much for what you have said. It has, I may assure you, been a very great pleasure to inaugurate and help on the work of this Conference. On behalf of the Committee I should like to thank all the planters who have been here and supported us so strongly. The interest they showed was far more than I ventured to hope for. I am exceedingly gratified that the Conference has gone on so well. I think that we may take it for granted that it is wanted by the planters, and I hope to ask my friend, the Chairman of the Planters' Association, to nominate a committee without further delay to arrange for the next Conference.

On behalf of myself I wish to thank the Committee and the Hon. Secretary for the amount of assistance they have given me. (Applause.)

The Conference was then declared closed.

MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA,

held at the Club, Sungkai, on 27th June, 1917, at 11.30 a.m.

PRESENT:

Mr. R. C. M. Kindersley (*in the Chair*)
„ H. C. E. Zacharias (*Secretary*)

and the following DELEGATES:

From Batang Padang D.P.A.	...	Messrs. T. H. B. Phillips and T. H Stewart
„ Batu Tiga D.P.A.	...	Mr. T. J. Cumming
„ Central Perak P.A.	...	„ P. G. Lawford
„ Johore P.A.	...	Messrs. J. H. Monson and A. L. Buyers
„ Kapar D.P.A.	...	Mr. L. Mooijaart
„ Klang D.P.A.	...	Messrs. C. A. Buxton and Edmund B. Prior
Kuala Lumpur D.P.A.	...	Messrs. F. G. Harvey, J B. Douglas and Lieut.-Col. A. J. Fox
„ Lower Perak P.A.	...	Messrs. F. Adelborg and R. H. Phillips
„ Malay Pen. Agl. Assn.	...	Mr. J. W. Kennedy
„ Negri Sembilan P.A.	...	Messrs. C. Ritchie, V. A. Tayler, Geo. Grant and W. Buyers
„ Ulu Selangor D.P.A.	...	Mr. W. de L. Brooke

VISITORS—Messrs. A. Tinker, J. R. Gordon, F. W. South, A. Gourlay, J. F. Todd, W. Forsyth, J. Milne, J. W. Rowan, A. T. MacIver and J. W. Anderson.

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1. The CHAIRMAN of the Batang Padang Planters' Association, Mr. T. H. Stewart, having welcomed the Planters' Association of Malaya to Sungkai, Mr. R. C. M. Kindersley suitably replies and thanks the Batang Padang members for their kind hospitality.

2. The minutes of the meeting held on 25th April are taken as read, confirmed and signed.

Mr. KINDERSLEY would like to take this opportunity of thanking members for his election, and Mr. Duncan for his kind reference to him at their last meeting, which he was very sorry he had been unable to attend. He hoped that his tenure of office would be of benefit to the Planters' Association of Malaya. In any case he could assure members that he had no other desire but serve them to his best ability.

(Applause.)

3.—PREVENTIVE QUARANTINE.

Mr. Mooijaart informs the meeting that the Sub-Committee had not yet completed their report, as the compilation of the facts was a very lengthy business and in this connection he would like to say how much the Association was indebted to Dr. Day, who had taken an immense trouble in the matter. The final report would probably be ready in time for their next meeting.

Mr. Lawford enquires what exactly the difference was between preventive and other quarantine; and whether it was not a fact that, if preventive quarantine was not practised in other countries it was because the length of the sea voyage in those cases took the place of the preventive quarantine resorted to in the Federated Malay States.

Mr. Cumming complains of an apparent grave laxity in the administration of the Quarantine Station at Port Swettenham. He knew of cases where immigrants had bolted after only one day in the station, the employer not being informed of the fact until weeks after. Recruiters who had got coolies so far, naturally got disheartened, if all their work was frustrated by such laxity at this end.

Mr. Tayler hopes that it will be possible to send out the Sub-Committee's report, before the next meeting is held, so that members be given an opportunity of considering same, before having to come to a decision.

4.—WAR RELIEF.

The Secretary reports subscriptions for the current quarter as follows:

Batu Tiga	$ 475.00
Central Pahang	465.00
Central Perak	474.00
Kajang	345.00
Klang	1,200.00
Krian	876.49
Kuala Langat	670.00
Kuala Lumpur	1,173.18
Kuala Selangor	255.50
Lower Perak	435.10
Taiping	316.68
Ulu Selangor	434.44
Colony	136.07
Johore	601.00
Kedah	200.00
Total ...	$8,057.46

He also reads a letter from Sir William Taylor:

"88, CANNON STREET,
"LONDON, E.C., 4,
"*26th April, 1917.*

"DEAR SIR,

"F.M.S. WAR RELIEF FUND NO. 2.

"I received by last mail your letters of the 8th and 16th March, the former making enquiry as to the case of —— and the latter with that of Lieutenant —— of the 3rd Royal Irish Fusiliers.

"With respect to Lieutenant —— no application for assistance has been received from anyone connected with him, and the Secretary of the —— was unable to give me any information on the subject except that Mr. —— was unmarried and he did not know of any dependents. I am pursuing the subject and shall be glad to learn if you have any information.

"The Executive Committee at their meeting of the 28th February had before them an application from Mrs. ——, widow of ——. A sum of £25 was sent to her on 1st March, and a further sum of £25 is to be paid to her in July.

"At the same meeting applications were considered from the following:

"Mrs. ——, widow of ——, to whom it was agreed to give £50 in two instalments of £25.

"Mrs. ——, mother of ——, formerly on —— Estate, of the 8th South Lancashire Regiment, killed in France in October, 1916, to whom a grant of £25 for 1917 was made.

"Mrs. ——, mother of Lieutenant ——, 13th East Yorkshire Regiment, formerly on —— Estate, missing since November, 1916, to whom the Committee voted £50 (in two instalments) for the current year.

"——, recently employed on —— Rubber Estate, to whose wife a sum of £20 was voted towards the expense of a pending operation.

"At the meeting of the Executive Committee of the 28th March, applications were dealt with from:

"Captain ——, 3rd Highland Light Infantry, formerly of —— Estate, to whom a grant of £50 (in two instalments) in respect of the current year was voted. His case will be considered again later but recently he appears to have received various sums from official sources.

"Mr. ——, King's Own Yorkshire Light Infantry, formerly of —— Estate, Mr. —— was wounded in May, 1915, and was a prisoner in Germany; his right leg was amputated in June, 1916. The Committee voted him a sum of £50 to enable him to get a second artificial leg and for other purposes.

"In my letter of 11th January, I alluded to the case of Mrs. ——, widow of ——. Her application was further considered on 31st January, when a sum of £25 was voted, and she was told to apply again in six months time if her circumstances required it.

"At the same meeting the case of Mrs. —— was considered. Mrs. —— desired a lump sum but was undecided as to whether or not to purchase a business. It was not considered necessary to make her a grant at present but should she require assistance to start a business the Committee would be prepared to help her, if made acquainted with the circumstances.

"At their meeting yesterday the Committee had before them an application from 2nd Lieutenant ——, formerly of —— Estate, to whom a grant of £25 was made.

"I am, etc.,
"(Sd.) W. T. Taylor.

"The Secretary,
"Planters' Association of Malaya,
"Kuala Lumpur."

The Secretary believes that this letter went to show again that the money collected was being made excellent use of and was actually relieving those for whom the Fund was being raised. He was sorry to think that in some quarters there still seemed to be a belief that their money was lying idle in London and that the relief work was not as actively carried out as the case demanded. He feels sure that with the periodical letters received from Sir William Taylor, similar to the one he had just read out, it was clear that there was no foundation for such allegations.

Mr. Kindersley concurs and although the amount collected was very creditable he thinks that still better might be done. He feels that every planter who for some reason or other could not go to the front should consider it his duty to subscribe liberally to this Fund.

5.—MAN-POWER.

The Secretary reports having forwarded the following letter to the Under Secretary as instructed:

"Sir,

"I have the honour to acknowledge receipt of your letter 279 of 12th March, and to inform you that the matter of Man-Power was again considered at the Annual General Meeting of this Association held on 25th April, when I was instructed to forward to you the following resolution, which was passed unanimously:

"That this meeting favours and would support any scheme of registration and classification of British Europeans in this

country, having for its object a decision, as to whether or not more men can in the best interests of the Empire be spared to join the Army.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*

"UNDER SECRETARY,

"FEDERATED MALAY STATES,

"KUALA LUMPUR."

6.—CURRENCY.

The SECRETARY reports having circularized all constituent Associations as follows:

"KUALA LUMPUR,

"*4th May, 1917.*

"DEAR SIR,

"QUARTER-CENT AND HALF-CENT COINS.

"Reverting to previous correspondence on this subject, I now beg to inform you that quarter-cent and half-cent coins may be obtained on application from the Colonial Treasurer, Singapore, and half-cent coins also from the Federal Treasurer, Kuala Lumpur.

"Believe me, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*"

7.—MOTOR CARS.

Mr. KINDERSLEY remarks that no reply had yet been received to the letter to the Under Secretary of the 9th of March.

LT.-COL. FOX proposes that the authorities be written to again. There was no doubt that in certain districts Europeans were subject to regular blackmail on the part of the drivers of these hired cars

Mr. TAYLER seconds the proposal and intimates that a resolution similar to the one passed by the Association had been forwarded by a Sanitary Board in Negri Sembilan and been approved of by their Resident. He believes that the Government had the whole question under consideration and hopes that things might be expedited if they wrote in again urging the matter.

Mr. PHILLIPS points out that the matter was one of great importance to planters attending drills and suggests that the military authorities might take the matter up as well.

The proposal of Lt.-Col. Fox is then put to the meeting and carried unanimously.

8.—COURT PROCEDURE.

The SECRETARY reports that the Standing Committee, to whom this matter had again been referred, had decided that they had nothing to add to their previous remarks on the subject.

Mr. KINDERSLEY presumes that the matter had better be left alone in the circumstances, though, of course, if there was any further complaint, the matter could always be re-opened.

9.—CURTAILMENT OF INDIAN EMIGRATION.

The SECRETARY reads the following correspondence:

"KUALA LUMPUR,
"*30th April, 1917.*

"No. 1465/17.

"SIR,

"With reference to your letter dated 22nd March, 1917, on the subject of the curtailment of Indian immigration, I am directed to state for the information of the Planters' Association of Malaya that the Government of Madras, having been made acquainted with the requirements of British Malaya, informed this Government that, as suggested, 7,000 adult labourers would be permitted to emigrate in the month of April.

"2. A letter has now been received from the Government of Madras which indicates that the number of labourers stated to be required for British Malaya is considered to be excessive.

"3. It is observed that the estimated total of adult male and female labourers required for the whole of 1917—*viz.*, 82,000, exceeds by 17,500 the annual average number of labourers who emigrated from Madras Presidency to the Straits Settlements and the Federated Malay States during the past six years. Taking into consideration male labourers only, with whose emigration the Government of Madras is particularly concerned at present, the demand now made would represent about 66,750 males, which number is about 14,300 in excess of the six years average.

"4. Having regard to these facts His Excellency the Governor of Madras in Council is of the opinion that sufficient provision will be made for the needs of the Straits Settlements and the Federated Malay States if the Government of Madras limit the number of male adults (over 18 years of age), whose emigration will be permitted, to 50,000 for the 12 months ending 31st December, 1917.

"5. The Government of Madras, while expressing the hope that this Government will be satisfied with this decision, intimates that if any further demands for adult male labourers are considered necessary there must be furnished a full statement of reasons or exceptional circumstances, if any, in justification of the additional requirements.

"6. A further representation has been made to the Government of Madras, but it is possible and even probable that they will adhere to their decision unless a very strong case can be made out for reconsideration. I am accordingly to request that the Committee of the Planters' Association will consider the question again and furnish a statement which can be laid before the Government of Madras showing as accurately as possible what are the requirements of this country in the way of Indian labour.

"I have, etc.,
"(Sd.) S. McARTHUR,
"*Under Secretary to Government, F.M.S.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*7th May, 1917.*

"SIR,

"I have the honour to acknowledge receipt of your letter 1465 of the 30th ulto. which has been considered at a meeting of my Standing Committee held to-day. The Committee regret very much to hear that the Government of Madras intends to cut down the emigration of male adult labourers to 50,000 during 1917.

"In the calculation made by the Government of Madras it is contended that the annual average number of labourers who emigrated from the Madras Presidency during the past six years was 64,500 per annum. My Committee cannot agree to the correctness of these figures as they include three war years which obviously cannot be included, if a fair average is to be arrived at; more particularly so when it is remembered that for more than half a year immigration from India was altogether stopped. Taking therefore the two pre-war years 1912-13 as a fair basis we find that the total number of assisted passages during these two years was 73,671 and 91,236, respectively—*i.e.*, an average of 82,454 assisted passages per annum. As you are aware this Association did suggest 82,000 as the minimum requirement they considered feasible for 1917.

"Again taking the assisted passages of adult males only for the three pre-war years

1911	64,706
1912	60,083
1913	67,957

we find the average to work out at 64,248 adult males per annum, which the Government of Madras now wish to cut down to 50,000; so that, so far from this Association asking for 14,300 adult males per annum more, the Government of Madras actually ask us to do

with 14,300 less than were obtained in the past on a fair average, and this without taking into account the necessity of making up deficiencies during the three war years.

"2. Another point which should be taken into consideration is the number of coolies returning to India. Already during the first four months of this year 23,640 have returned to India, which figure represents a probable excess of 8,000 repatriations in 1917 over and above those of 1916. It is evident that in arriving at the requirements of this country this increase has to be made up if the balance of coolies in the country is not to fall below that of previous years. But recognizing the urgency of the appeal made by the Government of Madras and by the Imperial Government this Association has made no allowance for this loss but has been satisfied to ask merely for the fair average number as calculated above.

"3. The Government of Madras probably are not aware to how large a measure of restriction in immigration this Association has already agreed by asking only for the maintenance of the 82,000 level, in view of the vastly increased acreage under rubber in tapping. It may, therefore, be useful to remind the Government of Madras of the total production of rubber in the Malay Peninsula, which was in

1911	... ...	10,782 tons
1912	... ...	20,327 „
1913	... ...	33,641 „
1914	... ...	47,006 „
1915	... ...	70,214 „
1916	... ...	99,063 „

The urgency for more labour, however, is not limited to the greatly increased area of rubber in tapping, but is in a special manner emphasized by the increase in diseases which, it is not too much to say, are in many parts threatening to suspend, if not to wipe out, the production of whole districts, if not immediately and energetically tackled. In this connection we would suggest that the opinion of the Director of Agriculture be taken and forwarded to the Government of Madras so as to provide independent corroborative evidence that we are not taking too gloomy a view in this respect.

"4. In conclusion, I am to suggest that, since the Government of Madras will severely restrict emigration of male adult labourers to this country, even if allowing the emigration of the 82,000 persons suggested by us, the existing restrictions on the emigration of females and minors under 18 years of age be relaxed.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*

"UNDER SECRETARY,

"FEDERATED MALAY STATES,

"KUALA LUMPUR."

"KUALA LUMPUR,

"No. 1465/17. "*25th May, 1917.*

"SIR,

"With reference to your letter dated the 7th May, 1917, I am directed to inform you that a telegram has been received from the Government of India stating that, pending receipt of reasons in support of the claim of the planting community for additional emigrants, the number of adult males that will be permitted to emigrate to Malaya during 1917 has been raised from 50,000 to 70,000.

"The reasons for requiring additional emigrants referred to above have been communicated to the Government of Madras.

"I have, etc.,

"(Sd.) W. MACKRAY,

"*for Under Secretary to Government, F.M.S.*

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. KINDERSLEY feels sure that the meeting would agree with him that this was a very satisfactory conclusion to the matter. He would like to add that they had received every possible assistance in this matter from the Controller of Labour and from the Local Government generally.

(Applause.)

Mr. CUMMING reports that recruiters had told him that if any of their coolies were sent by one boat the same recruiter would not be allowed to send any by the next three boats. He enquires whether this was a way of curtailing in practice the emigration?

Mr. BROOKE has not had the same experience but says that all kanganies complained that many of the recruited coolies were being sent back.

Mr. KENNEDY concurs and says that investigations by the agents in India are being made as to the great number of rejects.

Mr. MONSON recounts the experience of a planter who had personally gone over to recruit coolies and had found the depôt so full that it appeared he would have to keep his coolies for months in lodging houses at Negapatam.

Mr. HARVEY has no doubt that this state of affairs was largely due to the shortness of shipping accommodation. The Imperial Government had requisitioned a large percentage of the B. I. boats, and the Association could hardly address the Imperial Government, asking them for more shipping accommodation at the present time. He considers that they, themselves, through their kanganies, were

largely to blame, as a number of their kanganies adopted undesirable methods in recruiting, and until they had the further particulars promised them regarding "rejects," he thinks it best that nothing further should be done in the matter.

Mr. KINDERSLEY takes it that pending further enquiries being made it was agreed to let the whole matter stand over until the next meeting.

10.—ANTI-MALARIAL WORKS AT PORT SWETTENHAM.

Mr. MOOIJAART explains that the reply received from the Secretary to Resident dated 19th April, was probably due to the fact that there were two votes for Port Swettenham, one for the Anti-Malarial Board vote and the other the Drainage Scheme vote.

Mr. TAYLER regrets that the Association had laid itself open to such a snub.

11.—RE-PRINTING MINUTES.

The SECRETARY reports that the suggestion, referred to the Standing Committee, of having the minutes of previous meetings reprinted according to the subject matter, had been considered by them, but that they had come to the conclusion that with the present scarcity of paper and high cost of printing it would be advisable to let the matter stand over until after the war.

Mr. TAYLER thinks it a matter of importance to issue these reprints, as it would be of the greatest value to everybody concerned to have such a fund of information handy for ready reference. If the funds of the Association were insufficient to meet the expense he suggests that the money might be found by levying a special subscription.

Mr. PHILLIPS enquires whether drastic condensation was not possible.

After some further discussion it is agreed to obtain quotations and to consider the matter again at the next meeting.

12.—MACHINERY ENACTMENT.

The SECRETARY reads the following correspondence:

"KUALA LUMPUR,
"*27th April, 1917.*

"No. 5 in 199/17.

"SIR,

"With reference to the Machinery Enactment No. 5 of 1913 and to the prevention of accidents to persons operating rubber machinery, I have the honour to request the assistance of your Committee.

"2. There have been ten accidents, of which three were fatal (*vide* attached list), and I am advised by the Chief Inspector of Machinery that the provision of friction clutches with foot and hand actuating gear would have minimized and in some cases prevented serious accidents, it being impossible to completely shield or fence the machinery in question without interference with its efficiency.

"3. The Chief Inspector considers that the use of dog-clutches should be disallowed on the ground that, whilst transmitting power they cannot be readily disengaged and I am given to understand that a cheap type of friction clutch with foot and hand actuating gear is locally obtainable.

"4. Owing to the present condition of the machinery market, I hesitate to order immediate substitution of friction for dog-clutches and would be glad to have the views of your Committee as to whether such substitution would be a hardship on the rubber industry, also with regard to the provision of foot and hand clutch actuating gear to existing friction clutches.

"5. Would your Committee also favour me with their opinion on the prohibition of use of dog-clutches on all new plant.

"I have, etc.,

"(Sd.) W. Eyre-Kenny,

"*Senior Warden of Mines, F.M.S.*

"The Secretary,
"Planters' Association of Malaya,
"Kuala Lumpur."

LIST OF ACCIDENTS IN THE FEDERATED MALAY STATES WHICH HAVE OCCURRED AT RUBBER MACHINES, THE SERIOUSNESS OF WHICH WOULD HAVE BEEN MINIMIZED HAD MORE READY MEANS OF THROWING THE MACHINES OUT OF GEAR BEEN IN USE.

1. Fatal accident on Jendarata Rubber Estate, Teluk Anson, on 15th March, 1914, in which an attendant died as the result of injuries received by getting both arms caught in the gearing of a rubber machine.

2. Fatal accident at the Klang Rubber Factory, Klang, on the 10th June, 1915, in which a cooly had his right arm crushed between the rollers of a machine.

3. Fatal accident at New Labu Estate, Labu, on the 28th August, 1915, in which a cooly had the whole of his left arm torn off at the shoulder in a rubber machine.

4. Non-fatal accident on Selaba Rubber Estate, Teluk Anson, on the 20th April, 1915, an attendant got his left arm crushed between the gear wheels of a rubber machine. The injured limb had to be amputated.

5. Non-fatal accident on Selaba Rubber Estate, Teluk Anson, on 7th June, 1916, in which a cooly got the fingers of both hands crushed between the rollers of a machine while passing rubber through the rolls.

6. Non-fatal accident at Sua Betong Proper Estate, Port Dickson, on the 9th June, 1916, in which a machine attendant had his right hand taken off by the pinion wheels of a rubber machine.

7. Non-fatal accident on Sengat Rubber Estate, Kinta, on 22nd June, 1916, whereby a greaser got his right hand crushed in the gearing of a rubber machine.

8. Non-fatal accident at Sungei Sedu Estate, Banting, on the 11th October, 1916, in which a Tamil cooly had his right hand, fingers and thumb crushed in one of the Shaw's crêpeing machines.

9. Non-fatal accident at Kundang Estate, Rawang, on the 20th March, 1917, in which a Tamil cooly had the four fingers and back of his left hand badly crushed between the rollers of a macerating machine.

10. Non-fatal accident on Batak Rabit Rubber Estate, Teluk Anson, on the 7th April, 1917, a cooly got his right hand crushed between the rollers of a machine while attending to his duty of feeding rubber to the machine.

"KUALA LUMPUR,
"*14th May, 1917.*

"SIR,

"I have the honour to acknowledge receipt of your letter 5/199 of the 27th ultimo, which will be considered at the next meeting of our Association. In the meantime, I am instructed to ask for information regarding particulars of the cheap type of friction clutch, with foot and hand actuating gear mentioned by you, and also, as to where it can be obtained locally.

"I have, etc.,
"(Sd.) H. C. E. ZACHARIAS,
"SENIOR WARDEN OF MINES, "*Secretary.*
"FEDERATED MALAY STATES,
"KUALA LUMPUR."

OFFICE OF THE SENIOR WARDEN OF MINES,
"KUALA LUMPUR,
"*1st June, 1917.*

"No. 8 in 199/17.

"SIR,

"With reference to my letter No. 5 in 199/17 of 27th April, 1917, and in reply to yours of 14th May, 1917, I have the honour to forward two blue prints and a description—furnished by the designer—of Platt's patent safety gear.

"2. The Chief Inspector of Machinery has made the following remarks on the above-mentioned safety gear:

"(i) Mr. Platt informs me that one gear is all that is required to a battery of machines—I agree.

"(ii) No special gear need be insisted on, as it is certain that many gears of the same principle as Platt's will spring up.

"(iii) The cost is, I understand, $250—up to 75 horse-power engine and a slight increase after this size.

"(iv) I do not agree with Mr. Platt's contention that a gear can be fitted where we have a fast and loose pulley belt-driven shafting, I think, in such cases a clutch should be fitted.

"(v) The drawings of Platt's gear show the principle of an instantaneous declutching gear which can also be fitted to dog-clutches.

"3. It will be noted that the Chief Inspector is of opinion that Platt's gear enables the retention of existing dog-clutches.

"I have, etc.,

"(Sd.) W. Eyre-Kenny,

"*Senior Warden of Mines, F.M.S.*

"The Secretary,

"Planters' Association of Malaya,

"Kuala Lumpur."

(copy).

"Attached to C.S.O. Mines 1763/17.

"Notes on Platt's patent safety gear, as applied to rubber factory main drives.

"First arrangement shows the safety gear set to actuate a disc-type friction clutch working the driving shaft to four standard type rubber washers. A wire cord stretched taut above and below the machines can be actuated by hand or foot respectively.

"The drop weight is adjusted with sufficient fall to ensure a blow powerful enough to actuate weigh shaft and disengage the clutch.

"The second arrangement shows the same application but with the gear tripped by depression of the top taut wire.

"No. 3 arrangement shows the gear applied to an ordinary fast and loose pulley, belt-driven, with a sliding-bar striking gear. In this case the ordinary locking pin for retaining the belt fork in

its driving position is replaced by a simple pawl having its tail actuated by a pin on the lever in such a way that the first movement of the lever in the direction to strike the belt *off* lifts the pawl and releases the sliding bar which is then free to complete its movement to *off* position. This arrangement requires rather a steady pressure on the weight lever than a blow as in the first instance, the drop weight is adjusted just clear above the *on* position of the safety gear weigh lever.

"With a high speed back shaft and large diameter pulley it may prove necessary or advisable to provide a brake actuated also by the safety gear, but as the gear would be used in cases of sudden emergency all or most of the washers would be probably in gear; and the load would stop the back shaft in an instant, or during an exceedingly small linear movement of the surface of the washer rolls, which, we may presume, have caught the cooly's fingers, clothes, or hair.

"No. 4 arrangement shows a screw traverse striking gear and in this case the nuts on the fork must be bored out or replaced so as to slide freely outside the thread, movement being given to the fork by a hinged sector which can engage with and disengage from the thread on the traverse screw. As in the previous arrangement, the sliding gear is locked in its *in* position and this rocking sector is disengaged by the small lateral movement of the actuating lever. A steady pressure is required in this arrangement also so that the weight is adjusted with a slight clearance only. The last arrangement shows the safety gear applied to a dog-clutch and a higher drop, and, if necessary, a heavier weight is provided to insure the necessary jerk and consequent certain disengagement. The drop and weight can, if it is to be fitted to "difficult" clutches, be increased in length and mass.

"A diagramatic arrangement is also shown indicating a typical method of transferring the taut wire or "trip" to positions other than the main line over the principal machines. Thus the safety gear may be actuated from any part of the factory at any reasonable distance from the gear itself. Common examples of this in practice exist in cases where there is line of small machines in front of the others and perhaps a scrap washer behind the main line.

"Generally, it will be clear from the drawings and the above description that the safety gear may be easily applied to almost any arrangement of drive.

"Furthermore, the mere fitting of adequate weights will insure the working of the gear in the face of inattention to it or to its adjustments or to the free working of the main clutch or other disengaging gear; and thus, short of an actual jam, which could not pass unnoticed, the gear is practically infallible."

"KLANG,
"*19th May, 1917.*

"DEAR SIR,

"With reference to your request for an opinion in connection with letter No. 5 in 199/1917 from the Senior Warden of Mines, I beg to offer the following:

"It has been an admitted fact for many years among Machinery and Factory Inspectors at Home that any device for stopping a machine in case of accident is almost wholly useless if the person to whom the accident is happening has to operate it. Anyone who has been an eye-witness to such accidents, or to whom they may have happened, will corroborate this statement very fully. It is, therefore, my opinion that the use of such devices on each separate rubber machine is neither necessary nor efficacious.

"The use of dog-clutches (which are not really at all suitable for putting in and out of gear while the machinery is running) need not be discontinued if the following suggestion is carried out.

"A single, efficient friction clutch should be installed between the engine, or prime mover, and the driven machinery. In the great majority of factories this clutch is already in existence and in those where it is not, would not be at all difficult or expensive to install. This clutch would be fitted with a simple and reliable spring release gear, somewhat similar in design to that in use on the Werner-Pfleiderer scrap washer. The wire rope actuating this gear would be run at a convenient height over the whole battery of rubber machines, thus enabling any, or all, of the operators to stop the whole of the machines instantaneously. The mere fact of there being several machines running off the same shaft would ensure a quick stop; far quicker than that of a single machine.

"I do not think it necessary to enlarge further on this subject, the advantages of the system are sufficiently obvious.

"Yours faithfully,
"(Sd.) D. R. MAYHEW."

Mr. HARVEY suggests that a letter should be sent to the Senior Warden of Mines thanking him for the very courteous manner in which he had written to the Association. He had consulted his own engineer on the subject and he had expressed himself on the lines contained in the very excellent letter from Mr. Mayhew which they had just heard read out. He feels that they could not do better than incorporate this in their letter to the Senior Warden.

LIEUTENANT-COLONEL FOX points out that an injured man was the last person who could actuate a releasing gear and the latter, therefore, should be so arranged as to be available to every workman in the factory.

Mr. TAYLER thinks that the real difficulty lay in the impossibility of obtaining friction clutches at the present moment.

Mr. RITCHIE proposes that the Warden of Mines be written to on the lines of Mr. Mayhew's letter and that he be asked to let the matter stand over until after the conclusion of the war as friction clutches are unobtainable for the time being.

This is seconded by LIEUTENANT-COLONEL FOX and carried unanimously.

13.—FOOD SUPPLY.

Mr. KINDERSLEY reports that the Government had approached them with a view to increasing the food supply of the country. It was impossible for planters to grow rice, the only staple food of the country. It certainly was up to them to do all that was possible in encouraging other food supplies being grown and no doubt all members would use every effort to induce their coolies to plant vegetables, etc. But as regards rice, he feels that the most important matter would be for the Government to see that rail communication with Siam was opened up as quickly as possible in case there was any difficulty in getting ships to carry the necessary staple food to this country.

Mr. SOUTH explains the paddy experiments which the Agricultural Department was carrying on.

14.—ANNUAL AGRICULTURAL CONFERENCE.

The SECRETARY reports the receipt of the following letters:

"DEPARTMENT OF AGRICULTURE,
"KUALA LUMPUR,
"*17th May, 1917.*

"No. 1 in 419/17.

"SIR,

"In view of the success attending the experiment of holding an Agricultural Conference in Malaya last month, I should be glad if your Standing Committee would consider the advisability of holding further conferences.

"2. If it is considered that these are desirable, I should be glad if a committee could be nominated at an early date to make arrangements. Such a committee might this time include representatives of Perak and Negri Sembilan.

"I have, etc.,
"(Sd.) L. LEWTON-BRAIN,
"*Director.*

"SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KUALA LUMPUR,
"*8th June, 1917.*

"No. 3 in 419/17.

"SIR,

"In continuation of my letter of May, 1917, I have the honour to inform you that the question of future Agricultural Conferences was discussed at a meeting of the Advisory Committee of this Department on 30th May.

"2. It was agreed that it was desirable that a conference should be held annually.

"3. It was also suggested that a much larger general committee might be formed this year by asking each District Planters' Association to elect a representative. The executive committee might be elected from among the members of the general committee or might be separately nominated by the Planters' Association of Malaya.

"I have, etc.,
"(Sd.) L. LEWTON-BRAIN,
"*Director.*

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. KINDERSLEY concurs that the last Conference had been a great success and hopes that these conferences would become a standing institution.

Mr. MOOIJAART proposes that the Secretary be instructed to write to all Constituent Associations asking them to nominate one member each on the general committee of the next Agricultural Conference.

LT.-COL. FOX seconds the proposal, which is carried unanimously.

15.—CURTAILMENT OF RUBBER SHIPMENTS.

Mr. KINDERSLEY remarks that there had been a scare in regard to this matter. Apparently, a cable received by the Shipping Agents had been misunderstood. It had been generally taken that only 2,000 tons a month of rubber would be allowed to be shipped to British ports, whilst what actually had happened was that the Shipping Controller had specified that at least 2,000 tons of space for rubber shipped to British ports would have to be reserved. This was satisfactory as far as it went but he was not sure that they had got over all their difficulties yet.

Mr. HARVEY thinks the important point was to get authoritative information. No local body seemed to know anything, but it was surely of the utmost importance that they should know what it was intended to do. He would therefore propose: "(1) That the Government be requested to be good enough to give early intimation to the

Planters' Association of Malaya of any information they may be in possession of with regard to curtailments of rubber shipments. (2) That the Government be requested to consider the advisability of appointing a Government Officer as a 'Local Shipping Adviser,' who would collect information as to tonnage and be in touch with the Shipping Conferences and the British Controller of Shipping."

This is seconded by Lt.-Col. Fox and carried unanimously.

16.—RAILWAY LIABILITY.

Mr. Ritchie points out that the Railway were in the habit of refusing to give receipts for rubber sent to them for despatch unless the whole quantity actually left the station by the last train leaving the station on that day. This, of course, only applied to what the Railway considered small stations, but it was easy to understand that the practice was one greatly complicating the despatch of rubber from the estate. These were put to the greatest inconvenience by having to send one and the same consignment backwards and forwards to the station. The Railway maintained that until the rubber left the station they had not incurred any liability, but that the estates were at liberty to leave it at the station and provide a watchman of their own. He had written pointing out that the Government should have its own shed to store consignments in, and that it was, to say the least, strange that private consignors should send their own watchmen to look after these goods till despatched. The reply was that the Government could not see its way to provide sheds at all small stations on the line. He desired, therefore, to urge that the attention of Government should be called to this inconvenience. It was not reasonable to call all these places small stations. At Siliau, for instance, where there was no such provision, the freight average for rubber was about $295 per month, and he thought it was not unfair to ask for a watchman to be paid for by Government out of that. They had to ask for trucks beforehand and it was very often difficult to get all their rubber in on one day. They were able to get about four-fifths to the station, and if all were not in that day it simply meant that they had to take their rubber back and make out fresh consignment notes and all that. He would therefore put the following resolution to the meeting: "That the attention of Government be drawn to the inconvenience caused by the Railway regulation now in force by which a receipt for goods delivered for despatch is refused, unless the said goods can leave by train on the same day, and that Government be asked to amend the present regulation in order that, where accommodation is available for their reception, a receipt may be given for all goods delivered between 7 a.m. and 5 p.m.; at any rate at stations whose outward goods traffic reaches a certain minimum."

Mr. Mooijaart in seconding fully endorses the hardship pointed out by Mr. Ritchie and adds that on the Kuala Selangor line they had not more than two to three goods trains a week.

The resolution is agreed to unanimously.

17.—STANDING COMMITTEE.

The Secretary informs the meeting that the Kuala Selangor District Planters' Association had asked him to insert the following proposal in the agenda: "That all Chairmen of all Constituent Planters' Associations be members of the Standing Committee of the Planters' Association of Malaya—failing this—that minutes of proceedings at Standing Committee Meetings should be sent to all Chairmen."

Mr. Kindersley thinks that the Kuala Selangor proposer of this motion apparently quite misunderstood the function of this Committee which was really only an emergency Committee and had no power to deal definitely with any question. As proposed the Committee would become far too unwieldy.

Mr. Harvey points out that the Standing Committee had power to co-opt others and that the five members elected at the last Annual General Meeting had exercised that right.

Mr. Cumming considers that to add to the Standing Committee so great a number as suggested was quite superfluous, as that Committee would practically become the Planters' Association of Malaya, itself. He felt very grateful for all the work that the members of the Standing Committee had done and considers that their usefulness could not be enlarged by further additions.

The proposal is thrown out.

18.—SECTION 66 OF THE LABOUR CODE.

The Secretary informs the meeting that the Kuala Selangor District Planters' Association had instructed him to insert the following proposal in the agenda—*viz.*, "In the case of native estate owners taking on locally engaged coolies and where non-registration of such coolies be proved, a sufficient penalty be inflicted, and the wording of the Labour Enactment be made as applicable to native owners as to European owners."

Mr. Lawford intimates that he has had no difficulty in getting convictions.

Lt.-Col. Fox corroborates in respect of his own district.

The proposal is thrown out.

19.—EXPERIMENTAL FARMS.

Mr. KENNEDY has been requested by his Association to move at this meeting the necessary resolution with regard to the establishment of Experimental Farms, but before doing so he would like to remark upon the objects and reasons for the desire to establish such farms. The Malay Peninsula, as far as agricultural products are concerned, is practically dependent upon the one staple, rubber, and it seems undesirable that any tropical country should be almost wholly dependent upon one agricultural industry, so that the object of establishing Experimental Farms is to try and create new industries by proving what other agricultural products can be successfully and profitably grown in the different provinces.

For the future welfare of Malaya it is essential that the fostering of new industries be taken in hand so that if one industry fails, there may be others to replace it.

This is not a matter for private pioneering and he thinks they can reasonably call upon the Malayan Governments to establish Experimental Farms with a view to the further development of the resources of the Peninsula and of the Colony.

There are he thinks a number of very solid reasons why such farms should be established.

One reason is that the Government of the Federated Malay States at the present time is, as far as agricultural products are concerned, practically dependent for its revenue upon the rubber industry alone. In the midst of the unbounded prosperity which continues to attend this industry they are perhaps prone to be blind to the great danger of such a state of affairs being allowed to continue indefinitely. It requires no great stretch of their imagination to realize what would happen to this country if the rubber industry was to collapse, say, through some epidemic of disease destroying the trees. He has no doubt they all fervently hope that such a disaster will not eventuate. He does not think it will, but, as such a thing is certainly within the range of possibility, it becomes necessary for them to use every means in their power to further any scheme that has for its object the development of new crops, so that in the event of a calamity such as he has indicated taking place, they may be in a position to fall back upon industries, that might avert ruin to themselves as individuals and to the country generally.

Another reason why he thinks new crops should be developed and attempts made to attract capital to new enterprises is that it might counteract the tendency to over-production of rubber.

Yet another strong reason is that this great war in which they are engaged has taught them that every country of the Empire should develop and utilize its resources to the utmost in time of peace as well as in time of war.

They have in this Peninsula vast areas of fertile land, yet undeveloped, that are capable of producing huge quantities of foodstuff and other commodities, and there seems every reason why the exploitation of such possibilities should proceed with as little delay as possible. He thinks that an earnest endeavour ought to be made by the whole Peninsula not only to make itself more independent of outside food supplies but also to compete with other countries with a greater variety of agricultural products than what it is doing to-day. To assist in bringing this about it is essential that new crops be exploited.

There can be no question he thinks as to the vital necessity of establishing Experimental Farms and he contends it is the business of the Malayan Governments to be in a position to say what crops can, or cannot, be successfully and profitably grown in the countries which they govern.

If it is decided to establish Experimental Farms, the question then arises how are such farms to be organized and how are they to be controlled.

To be of any practical value such farms must not be mere experimental plots, but must be on a commercial scale.

The scheme is undoubtedly a comprehensive one and he is of opinion that it will require a great deal of very careful deliberation, as the success of such farms would wholly depend on whether they were properly organized and efficiently controlled.

The creation of a new department or an additional staff would seem to be necessary to control these farms as he thinks it is generally recognized that the present staff of the Agricultural Department has already more work on its hands than it can adequately deal with. In this connection he would suggest that if this Association decides to bring this proposition before the various Governments that it request them to appoint a commission which might be termed the "Agricultural Development Commission" consisting of planters nominated by the Association and approved by the Governments, with the Federated Malay States Director of Agriculture as Chairman.

He thinks that a body such as he has indicated would be best qualified to go into the whole matter, investigate the lines along which progress should be made and generally recommend how the objects in view may best be realized.

If these farms do become a living reality, he thinks they ought to be open to the general public so that everyone might have an opportunity of studying the various crops under experiment.

He would even go further than this and would suggest that the Governments concerned direct their District Officers to take the

necessary steps to encourage the native population to visit these farms, so that the utility of such experiments might be fully demonstrated to all classes of the community.

He does not think it is intended that these farms are to be for the benefit of the European planter only, but that they are to be established for the benefit of every community of the Peninsula, as only in this way can the countries concerned reap the full benefit of the scheme.

It may be that this scheme has not much attraction for them as individual rubber planters, while the whole industry remains the very lucrative business it is at present, but this is no reason why their attention should be exclusively concentrated on this one staple. He thinks it their duty to look upon themselves more as a body of agriculturists who have the future welfare of the country at heart and that it is up to them to assist to the best of their ability any scheme that has in view the further development of the vast resources of this particular part of the Empire.

He would now formally beg to move the following resolution:

"This Association considers that as the Malay Peninsula, as far as agricultural products are concerned, is practically dependent upon the one staple, rubber, it is highly desirable that something should be done in the way of creating new agricultural industries for the future welfare of Malaya, and that the Governments concerned should establish Experimental Farms throughout the Peninsula with a view to ascertaining what other agricultural crops can be successfully and profitably produced in the different provinces. The Association suggests that the Governments of Malaya appoint a Committee consisting of planters nominated by the Planters' Association of Malaya and approved by the Governments, with the Federated Malay States Director of Agriculture as Chairman, to go into the whole matter and to make recommendations as to how the object in view may best be realized."

Mr. SOUTH says that a certain amount had already been done in the direction indicated by Mr. Kennedy. The Advisory Committee of the Agricultural Department had considered the question for some considerable time and come to the conclusion that each farm should be at least of 1,000 acres of a minimum of 200 acres of say five different kinds of cultivation. They were at present contemplating the planting up of one such farm, but later on a great number of such farms in the various districts of the Peninsula where needed. It was a great pity that the public did not take greater interest in these matters, but he hopes that the institution of such farms would stimulate it.

Mr. CUMMING seconds the proposal which is carried unanimously.

20.—PREVENTION OF PLANT DISEASES.

Mr. KENNEDY proposes "that this Association views with considerable apprehension the fact that no governmental control exists over rubber tree diseases in Province Wellesley or in the State of Kedah. In view of the extensive areas under rubber in Province Wellesley and Kedah this Association considers it of vital importance that the Governments concerned should take the necessary steps to create a department for the control of disease, as any State allowing disease to go entirely uncontrolled not only endangers itself but adjoining States as well."

He was aware that as long as the war lasted it was probably not possible to get sufficient staffs, but he thinks that in the meantime at least arrangements should be made for the surrounding States to avail themselves of the services of the Federated Malay States Department.

Mr. MONSON seconds the proposal, which is carried unanimously, and the Secretary is instructed to forward the resolution to the Governments of the Colony and Kedah.

21.—ESTATE HOSPITALS.

The SECRETARY reads the following letter:

"KUALA LUMPUR,
"*15th June, 1917.*

"No. 4528/16.

"Sir,

"With reference to your letter dated the 27th December, 1916, on the subject of the medical relief provided for Indian labourers on estates in the Federated Malay States, I am directed to inform you that the Chief Secretary has no doubt that the requirement of the Government of Madras as to the replacement of unqualified men will have to be complied with. It is hoped therefore that steps will be taken to ensure that, as far as possible, all unqualified men now in charge of hospitals shall be replaced by qualified men. The Government of Madras desires that this change should be effected within two years at the outside.

"2. The suggestion of the Government of Madras as regards midwives will also doubtless have to be carried out. If midwives cannot be obtained locally, it would be advisable that application for them should be made or the vacancies advertised in Madras.

"I have, etc.,
"(Sd.) S. MCARTHUR,
"*Under Secretary to Government, F.M.S.*

"CHAIRMAN,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

Mr. MOOIJAART considers that this would entail a great hardship on the present staff of dressers, many of whom were very excellent men for the work they had to do. He hopes that the matter would be referred to the Standing Committee and be thoroughly gone into by them.

Agreed to.

22.—GENERAL.

The SECRETARY reports the issue of new draft Enactments which he is instructed to refer to the Standing Committee and bring up at the next meeting.

Mr. KINDERSLEY says there was a proposal sent him by the Kuala Selangor District Planters' Association *re* European Hospitals, but as the time had so far advanced he would suggest that this matter stand over until their next meeting.

Agreed to.

There being invitations from Taiping, Johore and Penang, the meeting resolves that the October meeting be held in Johore Bharu and the February meeting in Penang.

The meeting terminates at 2 p.m.

H. C. E. ZACHARIAS,
Secretary.

Abstract of Meteorological Readings in the various Districts of Malaya for the month of April, 1917.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bharu	...	146.7	83.4	91.80	73.06	18.73	77.3	.818	73.2	71.	...	1.04	.87
Pahang, Kuala Lipis	...	...	82.88	90.93	73.2	17.73	76.59	...	...	...	...	7.67	1.62
Johore, Johore Bharu	...	...	...	88.89	73.57	15.32	...	...	...	...	...	10.54	
Singapore, Kandang Kerbau ...	29.761	161.5	83.53	88.7	74.4	14.3	78.33	.898	...	79.3	...	9.37	2.98
Malacca, Durian Daun ...	29.877	150.5	82.1	87.5	71.9	15.6	78.9	.938	...	85.6	N.E.	1.85	.59
Negri Sembilan, Seremban ...	...	154.4	79.6	88.9	71.3	17.6	75.1	.795	72.3	79.3	N.W.	13.56	2.00
,, Kuala Pilah ...	...	142.8	82.5	90.9	73.8	17.1	79.3	.937	77.1	84.1	...	5.53	2.20
,, Port Dickson...	...	123.8	82.2	87.9	74.6	13.3	74.4	.866	74.8	78.9	...	7.83	2.13
Selangor, Kuala Lumpur ...	29.755	140.0	81.1	89.1	73.6	15.5	76.8	.846	73.9	79.	N.E.	6.21	1.14
,, Klang	...	...	80.5	85.5	73.6	11.9	76.8	...	...	...	...	8.93	2.07
,, Kuala Selangor ...	...	...	...	89.1	75.2	13.9	...	...	...	...	...	2.66	.51
,, Rawang	...	...	...	92.1	...	...	...	...	...	...	...	17.67	1.03
Perak, Telok Anson	...	...	81.9	92.	70.	22.	77.36	.877	...	81.	...	10.78	2.91
,, Ipoh	...	...	82.6	94.	71.	23.	77.40	.872	74.21	79.	...	10.55	2.00
,, Taiping	...	112.0	81.69	92.	72.	20.	77.30	.881	...	83.	...	17.04	2.99
,, The Cottage	...	...	...	...	...	...	...	...	...	...	...	26.81	4.64
,, Parit Buntar	...	...	83.17	93.	70.	23.	78.13	.896	...	79.	...	2.67	.70
Penang Georgetown	...	...	...	...	...	...	...	...	...	...	...	...	
Kedah, Alor Star	...	...	...	...	...	...	...	...	...	...	...	2.89	.66
Perlis, Perlis	...	...	...	91.56	74.2	17.36	...	...	...	...	...	5.34	1.85